

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Jeffery S. Haas et al	Docket No. :	IL-11088
Serial No. :	10/788,558	Art Unit :	1797
Filed :	02/26/2004	Examiner :	Samuel P. Siefke
For :	EXPLOSIVES TESTER		

Honorable Commissioner for Patents  
Alexandria, VA 22313-1450

Attention: Board of Patent Appeals and Interferences

Dear Sir:

APPELLANTS' BRIEF (37 C.F.R. § 1.192)

This brief is submitted in support of Appellants' notice of appeal from the Final Rejection, mailed October 30, 2007 finally rejecting claims 1-24 of the subject application.

Appellants' notice of appeal was filed January 29, 2008.

One copy of the brief is being transmitted per 37 C.F.R. § 41.37.

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## **I. REAL PARTY IN INTEREST**

The real party in interest is:

Lawrence Livermore National Security, LLC and the United States of America as represented by the United States Department of Energy (DOE) by virtue of an assignment by the inventor as duly recorded in the Assignment Branch of the U.S. Patent and Trademark Office.

## **II. RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

## **III. STATUS OF CLAIMS**

The application as originally filed contained claims 1-26.

The claims on appeal are claims 1-24.

The status of all the claims in the proceeding (*e.g.*, rejected, allowed or confirmed, withdrawn, objected to, canceled) is:

Claims 1-24 are rejected.

Claims 25 and 26 stand withdrawn as directed to a nonelected invention.

Claims 1-24 on appeal are reproduced in the Appendix.

## **IV. STATUS OF AMENDMENTS**

There have been no amendments filed subsequent to the Final Rejection mailed October 30, 2007.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellants' invention provides a disposable, portable, highly accurate, easy-to-use explosives detector that can quickly and accurately locate small amounts of explosives. The detector received a 2006 R&D 100 Award from R & D Magazine and a 2006 Excellence in Technology Transfer Award from the Federal Laboratory Consortium. The detector is licensed to Field Forensics, Inc. of St. Petersburg, Florida which began delivering the detector to emergency response, law-enforcement, and military personnel in October 2006. FIG. 4 and the portions of the specification reproduced below illustrate an embodiment of the invention.

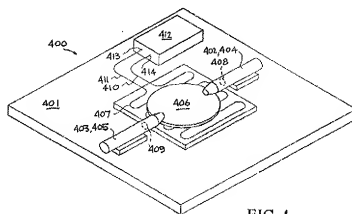


FIG. 4

"The inspection tester 400 is fast, extremely sensitive, low-cost, very easy to implement, and provides a very low rate of false positives. .... The inspection tester for explosives 400 has detection limits between 0.1 to 100 nanograms, depending on the type of explosives present. .. The inspection tester 400 is small enough that a number of them can fit in a pocket or brief case. (Specification Page 19, lines 6-15)

Independent claims 1 and 13 involved in the appeal are "read on" Appellants' specification. Portions of Appellants' specification are quoted and the paragraph containing the quote is identified by the page and line numbers.

### Claim 1

A tester for testing for explosives associated with a test location, comprising:

a first explosives detecting reagent;

a first reagent holder and dispenser, said first reagent holder and dispenser containing said first explosives detecting reagent;

a second explosives detecting reagent;

a second reagent holder and dispenser containing said second explosives detecting reagent;

a sample collection unit for exposure to said test location, exposure to said first explosives detecting reagent, and exposure to said second explosives detecting reagent; and

an environmental unit for receiving said sample collection unit and processing said sample collection unit for testing the test location for the explosives, said environmental unit being a heater or dryer for heating said sample collection unit.

### Specification & Drawings

an explosives tester system for testing for explosives associated with a test location.” (Page 4, lines 20-25)

The system comprises a first explosives detecting reagent; (Page 14, lines 24-25)

a first reagent holder and dispenser, the first reagent holder and dispenser containing the first explosives detecting reagent; (Page 4, lines 25-26)

a second explosives detecting reagent, (Page 4, line 25 and Page 5, line 1)

a second reagent holder and dispenser containing the second explosives detecting reagent; (Page 5, lines 1-2)

a sample collection unit for exposure to the test location, exposure to the first explosives detecting reagent, and exposure to the second explosives detecting reagent; (Page 5, lines 2-4)

environmental unit for receiving the sample collection unit and processing the sample collection unit for testing the test location for the explosives. (Page 5, lines 4-6) A heater 407 is operatively connected to the sample pad 406. (Page 17, lines 5-6) a dryer 505 (Page 19, line 23)

### Claim 13

A tester for testing for explosives associated with a test location, comprising:

a tester body;

a first reagent for detecting explosives;

a first reagent container for receiving said first reagent means;

a second reagent for detecting explosives;

a second reagent container for receiving said second reagent means;

a flat disk sample collection pad for exposure to said test location, exposure to said first explosives detecting reagent, and exposure to said second explosives detecting reagent, said flat disk sample collection pad operatively connected to said tester body, wherein said first reagent container is operatively connected to said body and positioned to deliver said first reagent to said flat disk sample collection pad, wherein said second reagent container is operatively connected to said body and positioned to deliver said second reagent to said flat disk sample collection pad: and

an environmental means for receiving said flat disk sample collection pad, said environmental means being a heater or a dryer operatively connected to said tester body for heating or drying said flat disk sample collection pad and testing the test location for the explosives.

### Specification & Drawings

an explosives tester system for testing for explosives associated with a test location.” (Page 4, lines 20-25)

explosives tester system comprises a body (Page 5, line 7)

a first explosives detecting reagent (Page 5, lines 9-10)

A first reagent holder and dispenser (Page 5, lines 7-8)

a second explosives detecting reagent, (Page 5, line 13)

A second reagent holder and dispenser (Page 5, line 10)

a disk shaped cotton pad 406 that is attached to the body 401. (Page 17, lines 7-8)

The first reagent holder and dispenser 402 is positioned to deliver the first explosives detecting reagent (reagent A) 404 to the pad 406. The second reagent holder and dispenser 403 is positioned to deliver the second explosives detecting reagent (reagent B) 405 to the pad 406. (Page 17, lines 19-22)

environmental unit for receiving the sample collection unit (Page 5, lines 4-5)

A heater 407 is operatively connected to the sample pad 406. (Page 17, lines 5-6)

a dryer 505 (Page 19, line 23)

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Final Rejection mailed October 30, 2007 states one grounds of rejection. The grounds of rejection is summarized as follows:

**Grounds of Rejection** - Claims 1-24 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Kardish et al reference (5,648,047) in view of the Dietze et al reference (5,035,862) and further in view of Appellants' allegedly admitted prior art (page 22-23). The rejection is stated in the Final Rejection mailed October 30, 2007.

## VII. ARGUMENT

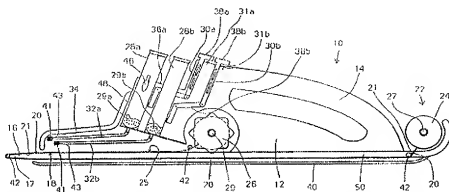
### **Argument Relating to the Single Grounds of Rejection**

Claims 1-24 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Kardish et al reference in view of the Dietze et al reference and further in view of Appellants' allegedly admitted prior art. The Kardish et al reference (hereinafter Kardish) is U.S. Patent No. 5,648,047 for a hand-held device for rapid colorimetric detection of explosives and narcotics. The Dietze et al reference (hereinafter Dietze), U.S. Patent No. 5,035,862, has nothing to do with detection of explosives and describes an analytical system in which a test carrier has at least one metallic conducting layer and the evaluating instrument has an induction heater that produces an alternating magnetic field. Appellants' allegedly admitted prior art (hereinafter Alleged Prior Art) was indicated to appear on pages 22-23 of Appellants' specification. The three references are described in greater detail below.

### **Kardish Device for Detection of Explosives and Narcotics**

The Kardish device uses a feed reel and take-up reel to draw a sampling area on a roll of film to a pointed tip. The pointed tip is use to swipe a sample on the sampling area on the roll of film. After swiping, the feed reel and take-up reel

are used to advance the sampling area on the roll of film to a position under a container of detecting reagent. The detecting reagent is deposited on the sampling area for the test. The structure and the operation of the Kardish device are illustrated in FIG. 1 and described in the portions of the specification reproduced below.



Housing 12 further includes a sampling area 16 and a testing area 18, ... preferably, sampling area 16 is formed as a tip 17 ... a roll 22 of substrate 20 is engaged by a feeding reel 24 which is rotatably connected to housing 12.

Used segments 25 of substrate 20 are preferably engaged by a take-up reel 26 which is rotatably connected to housing 12, preferably within housing 12. Take-up reel 26 is for advancing substrate 20 and thus the sampled material from sampling area 16 into testing area 18.

Device 10, further includes at least one, preferably two, more preferably four container 28 (two are shown in FIG. 1, referred to as 28a and 28b) for accommodating at least one detecting reagent 29a and 29b,

Device 10 further includes at least one dispensing mechanism 30a and 30b for dispensing a predetermined volume of reagents 29a and 29b, respectively, onto substrate 20 at testing area 18.

When a user wishes to test a material suspected as including a chemical such as explosive or narcotic, etc., the user first ensures that a clean segment of substrate 20 is located at sampling area 16 by rolling substrate 20 around take-up reel 26. Then, aided by tip 17, the user samples a surface of a tested object by wiping the surface with tip 17. At this point sampling is completed.



After sampling, the user, again aided by take-up reel 26, further rolls substrate 20 until the segment of substrate 20 that was previously used for sampling is located at testing area 18.

Since the actual distance between sampling area 16 and testing area 18 is constant for a given device 10, ratchet mechanism 29 is preferably employed to ensure that the appropriate segment of surface 20 is positioned at testing area 18. At this stage, ratchet mechanism 29 of take-up reel 26 and biasing mechanism 27 of feeding reel 24 ensure that surface 20 is still until the colorimetric test is completed.

After the positioning of the segment of substrate 20 containing the sampled material at testing area 18, the user activates dispensing mechanisms 28, at a predetermined order, thus a drop having a predetermined volume, formed due to the flexibility of containers 28 and the capillary effect of tubes 32, of each of reagents 29, is contacted with the sampled material at a predetermined sequential order, permitting a colorimetric reaction to take place provided that the sampled material contains the tested chemical. The color thus formed or does not form on substrate 20 is viewed by the user through transparent region or a movable cover 34 and the presence or absence of the tested chemical is determined.

### **Dietze System for Determination of Blood or Urine Component**

The Dietze reference has nothing to with detection of explosives and does not show or suggest Appellants' tester apparatus for testing for explosives. Dietze describes a blood and urine analytical system in which a test carrier has at least one metallic conducting layer and the evaluating instrument has an induction heater that produces an alternating magnetic field. Dietze is illustrated in FIG. 1 and described in the Dietze specification as follows:

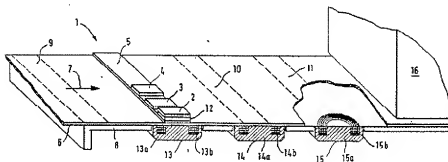
For the qualitative or quantitative analytical determination of fluids, especially body fluids such as blood and urine, so-called carrier-bound tests are being used more and more. For these tests, reagents are embedded in the dry state in appropriate test fields of a test carrier. When the test field is brought into contact with the sample, the reaction of sample and reagent leads to a measurable change in the test field.

Rapid and selective temperature conditioning of the test fields of test carriers is accomplished with an analytical system in which the test carrier has at least one metallic conducting layer that is assigned to the test field, runs

parallel to the test field and is in thermal contact with it. The evaluating instrument has an induction heater that produces an alternating magnetic field, and the guiding system of the test carrier in the evaluating instrument is designed so that the metallic conducting layer is in the effective region of the alternating magnetic field at least before the measurement.

The metallic conducting layer may, for example, comprise a metallized plastic. Particularly simple and well suited is a metal foil, especially of aluminum or copper, with a thickness of less than 0.5 mm and preferably of about 0.2 mm.

In certain application cases, it may be appropriate to use a metallic conducting layer of a ferro-magnetic material. The heat due to energy losses during magnetic reversal in such a material when in the alternating magnetic field, leads to particularly rapid heating of the layer.



Several induction heaters 13, 14 and 15 are embedded in the transport table 8. In each case, they comprise a ferrite core 13a, 14a, 15a and a coil 13b, 14b, 15b. In the area of the induction heater 15, the paper sheet is shown cut open, so that the circular construction of the core and the coil can be seen.

To heat it to an elevated temperature, the test field must be brought to the working area of an induction heater. In FIG. 1, a magnetic field emanates from the induction heater 13, when an alternating current flows through coil 13b of heater 13. The corresponding test field of a test strip, lying on positions 10 and 11, is in the working area of the alternating magnetic field emanating from the induction heaters 14, 15. Generally the metallic conducting layer 12 has to be in the working area of the magnetic field in the sense that it has to be positioned in the range of that field such that an effective heating is achieved due to the electric current inductively generated by the field. Preferably the distance between the coil 13b and the metal foil 12 should be as short as possible. In practice, a distance of 3 to 5 mm has proven especially satisfactory.

### **Alleged Prior Art**

The Alleged Prior Art was stated to appear on pages 22-23 of Appellants' specification. Pages 22-23 of Appellants' specification only contains the statements regarding prior art quoted below. Appellants do not admit anything beyond what is stated.

"The Meisenheimer complexes and Griess reaction are well known in the art and need not be described here." (Page 22, lines 9-10 of Appellants' Specification)

"Dryers with heaters are well known in the art and need not be described here." (Page 23, lines 5-6 of Appellants' Specification)

### **Prima Facie Case of Obviousness Has Not Been Established**

The Examiner has not established a "Prima Facie Case of Obviousness" in combining "Kardish" and "Dietze" and the "Alleged Prior Art." The initial burden of factually supporting a *prima facie* conclusion of obviousness (M.P.E.P. Section 2142) has not been met. Three basic criteria are required to establish a *prima facie* case of obviousness.

The prior art reference (or reference when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Appellant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The Examiner must provide reasons for combining the references (Examination Guidelines for Determining Obviousness in Light of the Supreme Court's *KSR v. Teleflex* Decision).

There must be a reasonable expectation of success.

### Error in Holding that the References Teach Claim Limitations

The Examiner erred holding that the references teach all of Appellants' claim limitations. The "Kardish" and "Dietze" and "Alleged Prior Art" references do not disclose many Applicants' claim limitations. One criteria of the Examiner's initial burden of factually supporting a *prima facie* conclusion of obviousness is: "the prior art reference (or reference when combined) must teach or suggest all the claim limitations." In assessing any *prima facie* conclusion of obviousness the guidance of the Supreme Court in *Graham v. John Deere Co.* is used. *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966) requires determining: "the scope and content of the prior art" and ascertaining "the differences between the prior art and the claims at issue."

For example, the "Kardish" and "Dietze" and "Alleged Prior Art" references do not disclose Applicants' limitations identified below.

"a flat disk sample collection pad for exposure to said test location, exposure to said first explosives detecting reagent, and exposure to said second explosives detecting reagent, said flat disk sample collection pad operatively connected to said tester body. (Claim 13)"

The "Kardish" and "Dietze" and "Alleged Prior Art" references only show "a roll of film (paper, cloth and synthetic membrane)" as in Kardish and "test strips with the help of a sheet of absorptive paper" as in Dietze. The "Kardish" and "Dietze" and "Alleged Prior Art" references do not show or suggest Applicants' limitation setout above.

The "Kardish" and "Dietze" and "Alleged Prior Art" references do not show or suggest Applicants' limitations "an environmental unit for receiving said sample collection unit and processing said sample collection unit for testing the test location for the explosives, said environmental unit being a heater or dryer for heating said sample collection unit (Claim 1)" or "an environmental

means for receiving said flat disk sample collection pad, said environmental means being a heater or a dryer operatively connected to said tester body for heating or drying said flat disk sample collection pad and testing the test location for the explosives (Claim 13). The Kardish reference does not show any structure serving as "an environmental unit ... receiving ... and processing ... said sample collection unit ... for testing the test location for explosives, said environmental unit being a heater or dryer ...". The Dietze reference has nothing to with detection of explosives and does not show any structure serving as "an environmental unit for receiving said sample collection unit and processing said sample collection unit for testing the test location for the explosives, said environmental unit being a heater or dryer."

Also, the "Kardish" and "Dietze" and "Alleged Prior Art" references do not disclose the following claim limitations of Appellants' claims on appeal: "wherein said environmental unit is a heater," "wherein said environmental unit is a dryer," "wherein said environmental unit is a heater and dryer," "wherein said environmental unit is a chemical heater," "wherein said environmental unit is an electric heater," "including a heating pad," "including a receiving unit for receiving said sample collection unit," "including a heating pad and a receiving unit for receiving said sample collection unit," "including a battery for providing power to said heater," "including a switch for controlling said heater," or "including a battery for providing power to said heater and a switch for controlling said heater."

Since the limitations listed and described above are not shown by "Kardish" or "Dietze" or the "Alleged Prior Art", a *prima facie* case of obviousness has not been established. Further, since "Kardish" and "Dietze" and the "Alleged Prior Art" fail to show the claim limitations of Applicants' claims 1-24 there can be no combination of the three references that would show

Applicant's invention. There is no combination of "Kardish" and "Dietze" and the "Alleged Prior Art" that would produce the combination of elements of Applicants' claims 1-24. Thus, the combination of references in the Final Rejection mailed October 30, 2007 fails to support a rejection of claims 1-24 under 35 U.S.C. § 103(a), and the rejection should be reversed.

**No Reason for Combining Kardish, Dietze, and Alleged Prior Art**

Another criterion of the Examiner's initial burden of factually supporting a *prima facie* conclusion of obviousness is: the Examiner must provide reasons for combining the references (Examination Guidelines for Determining Obviousness in Light of the Supreme Court's KSR v. Teleflex Decision). The Final Rejection mailed October 30, 2007 does not provide an explanation of how or why the Kardish reference and the Dietze reference and the Alleged Prior Art reference would or could be combined.

The Dietze reference has nothing to do with detection of explosives, does not show or suggest Appellants' tester apparatus for testing for explosives, and there would be no reason for combining Dietze with Kardish. Dietze describes a blood and urine analytical system in which a test carrier has at least one metallic conducting layer and the evaluating instrument has an induction heater that produces an alternating magnetic field. The Kardish device does not utilize the Dietz test carrier with at least one metallic conducting layer and the Kardish device does not need the Dietz alternating magnetic field. There is no reason for combining Dietze with Kardish. There is no reason for combining the Alleged Prior Art with Dietze or Kardish and the Final Rejection mailed October 30, 2007 does not provide reasons for combining the Alleged Prior Art with Dietze or Kardish.

Thus, the combination of references in the Office Action mailed October 30, 2007 fails to support a rejection of claims 1-24 under 35 U.S.C. § 103(a), and the rejection should be reversed.

**No Reasonable Expectation of Success With the Proposed Combination**

The criteria that “There Must Be A Reasonable Expectation of Success” in combining the Kardish and Dietze and Alleged Prior Art references has not been established. For example, claim 13 includes the following element:

“a flat disk sample collection pad for exposure to said test location, exposure to said first explosives detecting reagent, and exposure to said second explosives detecting reagent, said flat disk sample collection pad operatively connected to said tester body.”

To begin with it should be noted that Kardish, Dietze, and the Alleged Prior Art references all fail to show this claim element.

The primary Kardish reference discloses “a roll 22 of substrate 20 ... Roll 22 of substrate 20 is engaged by a feeding reel 24 which is rotatably connected to housing 12.” “Used segments 25 of substrate 20 are preferably engaged by a take-up reel 26 which is rotatably connected to housing 12, preferably within housing 12. Take-up reel 26 is for advancing substrate 20 and thus the sampled material from sampling area 16 into testing area 18.”

Applicants’ “flat disk sample collection pad” is very different from the Kardish “roll 22 of substrate 20.” Applicants’ “flat disk sample collection pad” claim element would not work in the Kardish reference and would destroy the operability of the Kardish reference device. Applicants’ “flat disk sample collection pad” would not “roll” and would not be taken up by the Kardish “Take-up reel 26 is for advancing substrate 20.”

The Dietze et al reference does not show Applicants’ claim 13 element “a flat disk sample collection pad for exposure to said test location, exposure to said

first explosives detecting reagent, and exposure to said second explosives detecting reagent, said flat disk sample collection pad operatively connected to said tester body." The Alleged Prior Art does not show Applicants' claim 13 element "a flat disk sample collection pad." There would not be a reasonable expectation of success in combining the primary Kardish reference and the Dietze et al reference and the Alleged Prior Art reference. The rejection should be reversed.

#### **Secondary Considerations Supporting NonObviousness of Invention**

Appellants present "secondary considerations" to establish nonobviousness of Appellants' invention of claims 1-24 on appeal. Appellants' invention has been licensed, has obtained commercial success, has obtained recognition by peers and praise by others, and Applicants' invention fulfills an important and long felt need.

Appellants' invention of claims 1-24 on appeal provides a disposable, portable, highly accurate, easy-to-use explosives detector that can quickly and accurately locate small amounts of explosives. The invention of claims 1-24 on appeal has been licensed to Field Forensics, Inc. of St. Petersburg, Florida which began delivering the detector to emergency response, law-enforcement, and military personnel in October 2006. The detector invention of claims 1-24 on appeal received a 2006 R&D 100 Award from R & D Magazine and a 2006 Excellence in Technology Transfer Award from the Federal Laboratory Consortium.

#### **Invention Has Been Licensed And Obtained Commercial Success**

The May 4, 2006 issue of the *Valley Times* newspaper states, "The lab has licensed the technology to Field Forensics Inc. of St. Petersburg, Fla." A copy of The May 4, 2006 issue of the *Valley Times* is enclosed. The May 4, 2006 News



Release "Screening tool to help detect explosives nets technology transfer award for LLNL researchers" by the Lawrence Livermore National Laboratory states, "The technology has been licensed to Field Forensics Inc., a St. Petersburg, Fla., company, and went on the market last October." A copy of the May 4, 2006 News Release "Screening tool to help detect explosives nets technology transfer award for LLNL researchers" by the Lawrence Livermore National Laboratory is attached. Field Forensics Inc. (FFI), Applicants' licensee, sells models of Applicants' claimed invention worldwide. A copy of the February 15, 2007 Field Forensics Inc. (FFI) website is attached.

Attached are declarations by Catherine Elizondo and Eddie E. Scott providing facts about Applicants' claims 1-24 invention having been licensed. The declaration by Catherine Elizondo states: "I confirm that the explosives detector called the Easy Livermore Inspection Test for Explosives or ELITE has been licensed to Field Forensics Inc. I negotiated the license agreement between The Regents of the University of California and Field Forensics Inc. of St. Petersburg, Florida and am familiar with the technology licensed. One of the inventions licensed by the license agreement is Record of Invention IL-11088. The subject patent application IL-11088 is a patent application based upon Record of Invention IL-11088 and the subject patent application IL-11088 is one of the patent applications licensed to Field Forensics Inc. under the license agreement." The declaration by Eddie E. Scott states: "I have reviewed the license agreement between The Regents of the University of California and Field Forensics Inc. of St. Petersburg, Florida. I confirm that the explosives detector called the Easy Livermore Inspection Test for Explosives or ELITE has been licensed to Field Forensics Inc. One of the inventions licensed by the license agreement is Record of Invention IL-11088. The subject patent application IL-11088 is a patent application based upon Record of Invention IL-11088 and the subject patent

application IL-11088 is one of the patent applications licensed to Field Forensics Inc. under the license agreement."

### **Invention Has Obtained Recognition by Peers & Praise by Others**

The article "Pocket-sized Test Detects Trace Explosives," in the October 2006 issue of Science & Technology Review (S&TR) contains the following statements:

"SECURITY forces throughout the world need detection tools that can quickly and accurately locate small amounts of explosives. Technology developed by Lawrence Livermore will provide emergency response, law-enforcement, and military personnel with an easy-to-use explosives detector small enough to carry in a shirt pocket. This technology, called E.L.I.T.E.<sup>TM</sup> (Easy Livermore Inspection Test for Explosives), is inexpensive and requires minimal training for deployment."

"The E.L.I.T.E. card technology was developed by a team of scientists and engineers from the Laboratory's Forensic Science Center (FSC) and Center for Energetic Materials. Led by FSC deputy director John Reynolds, the team won a 2006 R&D 100 Award for the new technology."

"The product, which also received a 2006 Excellence in Technology Transfer Award from the Federal Laboratory Consortium, is marketed by Field Forensics, Inc., of Florida."

"Since October 2005, when units became commercially available, Field Forensics has sold E.L.I.T.E. cards to many government agencies, including the Department of Homeland Security, New York State Police, Royal Canadian Mounted Police, and Queensland (Australia) Police."

A copy of the article "Pocket-sized Test Detects Trace Explosives," in the October 2006 issue of Science & Technology Review (S&TR) is enclosed.

The article "FLC AWARDS – 2006 AWARDS FOR EXCELLENCE IN TECHNOLOGY TRANSFER DEPARTMENT OF ENERGY - Lawrence

Livermore National Laboratory - ELITE: Easy Livermore Inspection Tester for Explosives" in the Department of Energy (DOE) website contains the following statements:

"International terrorist activity has increased markedly in recent years, spurring demand by security agencies worldwide for efficient, accurate explosives detection capabilities."

"To meet this need, Lawrence Livermore National Laboratory (LLNL) perfected a disposable, portable, highly accurate explosives detector."

"Field Forensics is manufacturing 500 ELITE cards for DHS and began delivery in October 2005."

"In autumn 2005, Field Forensics introduced the ELITE detection card and associated technology to a broader audience at an annual security conference attended by many state law enforcement agencies."

A copy of the article "FLC AWARDS – 2006 AWARDS FOR EXCELLENCE IN TECHNOLOGY TRANSFER DEPARTMENT OF ENERGY" on the February 15, 2007 Department of Energy (DOE) website is attached.

The article "FLC's Tech Transfer Award Winners" in the June/July issue of Innovation: America's Journal of Technology Commercialization" contains the following statements:

"More than 700 laboratories and research centers—representing almost all federal departments and agencies—conduct over \$100 billion in research and development annually and employ more than 100,000 scientists and engineers. The Awards for Excellence in Technology Transfer are presented each year to FLC member laboratories and their partners for successfully transferring federally developed technologies."

"Lawrence Livermore National Laboratory ELITE: Easy Livermore Inspection Tester for Explosives Summary: A disposable, portable, highly accurate explosives detector. The ELITE detection card is highly sensitive to more than

30 explosives, making it one of the most effective detection systems available.”

“Transfer: Field Forensics, Inc. responded to a Federal Business Opportunities announcement of the ELITE licensing opportunity and was chosen as the licensee.”

A copy of the article ““FLC’s Tech Transfer Award Winners” in the June/July issue of Innovation: America’s Journal of Technology Commercialization” is attached.

**Applicants’ Invention Fulfills an Important and Long Felt Need**

The 08/23/2006 article “The Three Sectors of Society That Rely on Explosives Detection,” <http://www.explosives-detection.info/the-three-sectors-of-society-that-rely-on-explosives-detection.html>, shows that there is an important and long felt need for explosives detection. A copy of the article is attached. The article states: “After an explosion one does not need an expert to conduct explosives detection. For security personnel, however, the real trick is finding a way to detect an explosives device before its detonation leads to injuries or fatalities. Three different sectors have had reason to hire large numbers of security personnel. Three different sectors of society have reason to purchase equipment for explosives detection. The following article takes a closer look at the nature of the security needs in those three sectors. It also mentions how new and improved detection devices can alleviate the threat posed by many types of dangers.

Explosives, such as those in firecrackers, have been around for quite some time. The need for detection of those who possess such explosives has recently created an entire new industry. The equipment produced by manufacturers within that industry has been purchased by groups in three different sectors of modern-day society.

Those involved with transportation security represent one group that has come to rely on explosives detection. At one time detection of explosives relied exclusively on the use of metal detectors. Present-day suicide bombers, however, have forced those in transportation security to look beyond the ability to detect metallic devices. Present-day explosives detection must be able to pick-up those who have non-metallic devices on their person.

One device that can do just that is the Sentinel II, a device used at portals in airports. The Sentinel II causes a flow of air to pass over each passenger. The air removes any loose explosives particles from the skin or clothing. The sample obtained from each passenger needs to be analyzed for explosives.

The members of the military occupy the second sector of society that has come to rely on explosives detection. The manufacturers of the detection devices for the military have focused their efforts on the miniaturization of existing devices. They have now developed collective protection alarms that are easy to move from place to place. Such alarms offer added protection to military vehicles, small boats with military personnel and command bunkers.

The third sector of society that has started to use explosives detection contains the persons involved with facilities security. This represents a large sector, one with many possible targets for explosive devices. Some of the facilities can be described as vital utilities. Water treatment plants and electrical generators powered by nuclear reactors are two such vital utilities. Sports centers and shopping malls are also facilities that have been mentioned as "soft targets" for explosives experts.

At all of those facilities the security personnel have three major concerns. One concern focuses on possible contamination in the heating, ventilation or air conditioning systems. A second concern considers the possible contamination of

the water supply. The third concern brings-up the need for explosives detection. That is the fear that someone could plant a bomb inside of any such facility.

The above information has failed to mention one further possible threat to the occupants in any facility. It is also a threat that could disrupt the functioning of a transportation system. That unmentioned threat received much media attention in the mid 1990's. At that time, a terrorist released a toxic gas into a Japanese subway.

The July 2005 article "HomelandDefenseStocks.com Reports: As Terrorist Attacks Continue, Need for Explosives Detection System Technology Surges," in [www.HomelandDefenseStocks.com](http://www.HomelandDefenseStocks.com), states, "www.HomelandDefenseStocks.com (HDS) an investor news portal for the homeland defense and security sector, reports on the need for explosives detection system technologies as threats of terrorist attacks continue. Companies working towards bomb detection technology include L-3 Communications Security and Detection Systems, Inc. (NYSE: LLL), the world's leading supplier of X-ray security screening systems; Markland Technologies (OTC BB: MRKL) a defense and homeland security company transforming advanced laboratory technology into real-world products such as next-generation electronic imaging and other detection solutions; Sniffex (OTC: SNFX) manufacturer of a pocket-sized, hand held explosives detection device; and Law Enforcement Associates Corporation (OTC BB: LENF), a manufacturer of a diverse line of undercover surveillance and detection products." A copy of the article "HomelandDefenseStocks.com Reports: As Terrorist Attacks Continue, Need for Explosives Detection System Technology Surges" is attached.

The invention of Applicants' claims 1-24 fulfills this important and long felt need. The invention of Applicants' claim 1-24 provides an explosives tester that is fast, sensitive, and is easy to implement. The explosives tester provides a

simple, chemical, field spot-test to provide a rapid screen for the presence of a broad range of explosive residues. The explosives tester is fast, extremely sensitive, low-cost, very easy to implement, and provides a very low rate of false positives. The explosives tester for explosives provides a fast, sensitive, low-cost, very easy to implement system for testing the suspected packages. The explosives tester for explosives is inexpensive and disposable. The explosives tester for explosives has detection limits between 0.1 to 100 nanograms, depending on the type of explosives present. A large number of common military and industrial explosives can be easily detected such as HMX, RDX, NG, TATB, Tetryl, PETN, TNT, DNT, TNB, DNB and NC. The explosives tester is small enough that a number of them can fit in a pocket or brief case. The explosives tester can be used virtually anywhere, car portal checkpoints, airports, first responders, Federal, State, and local agencies. The explosives tester can be used as a primary screening tool by non technical personnel to determine whether a surface contains explosives. Explosive Ordinance Disposal teams cannot simply explode suspect packages for concerns of disbursing radioactive material, biological agents, or chemical agents.

#### **Secondary Considerations Overcome Rejection**

The secondary considerations that the invention of Applicants' claims 1-24 has been licensed and has obtained commercial success, has obtained recognition by peers and has obtained praise by others, and fulfills an important and long felt need are substantial. The secondary considerations must be considered in deciding the obviousness or nonobviousness of Applicants' claims 1-24 on appeal. The secondary considerations overcome the rejection of Applicants' claims 1-24 on appeal under 35 U.S.C. § 103(a) over the Kardish, Dietze, and the Alleged Prior Art references stated in the Final Rejection mailed October 30, 2007.

### SUMMARY

The present invention provides a disposable, portable, highly accurate, easy-to-use explosives detector that can quickly and accurately locate small amounts of explosives. The detector received a 2006 R&D 100 Award from R & D Magazine and a 2006 Excellence in Technology Transfer Award from the Federal Laboratory Consortium. The detector is licensed to Field Forensics, Inc. of St. Petersburg, Florida which began delivering the detector to emergency response, law-enforcement, and military personnel in October 2006.

The Examiner has not established a "Prima Facie Case of Obviousness" in combining "Kardish" and "Dietze" and the "Alleged Prior Art" references. The references do not disclose many Applicants' claim limitations, there is no reason for combining the references, and there would not be a reasonable expectation of success in combining the references. Appellants "secondary considerations" establish nonobviousness of Appellants' invention of claims 1-24 on appeal.

It is respectfully requested that claims 1-24 on appeal be allowed.

Respectfully submitted,

By:  \_\_\_\_\_

Eddie E. Scott

Lawrence Livermore National Security, LLC  
7000 East Avenue, Mail Code L-703  
Livermore, CA 94550  
Attorney for Appellants  
Registration No. 25,220  
Telephone No. (925) 424-6897

Date: March 12, 2008



## VIII. CLAIMS APPENDIX

1. A tester for testing for explosives associated with a test location, comprising:
  - a first explosives detecting reagent;
  - a first reagent holder and dispenser, said first reagent holder and dispenser containing said first explosives detecting reagent;
  - a second explosives detecting reagent;
  - a second reagent holder and dispenser containing said second explosives detecting reagent;
  - a sample collection unit for exposure to said test location, exposure to said first explosives detecting reagent, and exposure to said second explosives detecting reagent; and
  - an environmental unit for receiving said sample collection unit and processing said sample collection unit for testing the test location for the explosives, said environmental unit being a heater or dryer for heating said sample collection unit.
2. The tester of claim 1 wherein said environmental unit is a heater.
3. The tester of claim 1 wherein said environmental unit is a dryer.
4. The tester of claim 1 wherein said environmental unit is a heater and dryer.
5. The tester of claim 1 wherein said environmental unit is a chemical heater.
6. The tester of claim 1 wherein said environmental unit is an electric heater.
7. The tester of claim 6 including a heating pad.
8. The tester of claim 6 including a receiving unit for receiving said sample collection unit.

9. The tester of claim 6 including a heating pad and a receiving unit for receiving said sample collection unit.

10. The tester of claim 6 including a battery for providing power to said heater.

11. The tester of claim 6 including a switch for controlling said heater.

12. The tester of claim 6 including a battery for providing power to said heater and a switch for controlling said heater.

13. A tester for testing for explosives associated with a test location, comprising:

a tester body;

a first reagent for detecting explosives;

a first reagent container for receiving said first reagent means;

a second reagent for detecting explosives;

a second reagent container for receiving said second reagent means;

a flat disk sample collection pad for exposure to said test location, exposure to said first explosives detecting reagent, and exposure to said second explosives detecting reagent, said flat disk sample collection pad operatively connected to said tester body,

wherein said first reagent container is operatively connected to said body and positioned to deliver said first reagent to said flat disk sample collection pad,

wherein said second reagent container is operatively connected to said body and positioned to deliver said second reagent to said flat disk sample collection pad; and

an environmental means for receiving said flat disk sample collection pad, said environmental means being a heater or a dryer operatively connected to said tester body for heating or drying said flat disk sample collection pad and testing the test location for the explosives.

14. The tester of claim 13 wherein said environmental means is a heater.
15. The tester of claim 13 wherein said environmental means is a dryer.
16. The tester of claim 13 wherein said environmental means is a heater and dryer.
17. The tester of claim 13 wherein said environmental means is a chemical heater.
18. (Original).
19. The tester of claim 18 including a heating pad.
20. The tester of claim 18 including a receiving unit for receiving said flat disk sample collection pad.
21. The tester of claim 18 including a heating pad and a receiving unit for receiving said flat disk sample collection pad.
22. The tester of claim 18 including a battery for providing power to said heater.
23. The tester of claim 18 including a switch for controlling said heater.
24. The tester of claim 18 including a battery for providing power to said heater and a switch for controlling said heater.

## IX. EVIDENCE APPENDIX

1. Declaration by Catherine Elizondo.
2. Declaration by Eddie E. Scott.
3. May 4, 2006 issue of the *Valley Times*.
4. May 4, 2006 News Release “Screening tool to help detect explosives nets technology transfer award for LLNL researchers” by the Lawrence Livermore National Laboratory.
5. February 15, 2007 Field Forensics Inc. (FFI) website.
6. Article “Pocket-sized Test Detects Trace Explosives,” October 2006 issue of *Science & Technology Review*.
7. Article “FLC AWARDS – 2006 AWARDS FOR EXCELLENCE IN TECHNOLOGY TRANSFER DEPARTMENT OF ENERGY” on the February 15, 2007 Department of Energy (DOE) website.
8. Article ““FLC’s Tech Transfer Award Winners” in the June/July issue of *Innovation: America’s Journal of Technology Commercialization*.
9. Article “The Three Sectors of Society That Rely on Explosives Detection,” <http://www.explosives-detection.info/the-three-sectors-of-society-that-rely-on-explosives-detection.html>.
10. Article “HomelandDefenseStocks.com Reports: As Terrorist Attacks Continue, Need for Explosives Detection System Technology Surges,” in [www.HomelandDefenseStocks.com](http://www.HomelandDefenseStocks.com).

#### X. RELATED PROCEEDINGS APPENDIX

There are no entries in the Related Proceedings Appendix.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Jeffery S. Haas et al	Docket No. :	IL-11088
Serial No. :	10/788,558	Art Unit :	1743
Filed :	02/26/2004	Examiner :	Samuel P. Siefke
For :	EXPLOSIVES TESTER		

DECLARATION UNDER 37 CFR § 1.132

Declaration by Catherine Elizondo

Commissioner of Patents and Trademarks  
Alexandria, VA 22313-1450

Dear Sir:

I, Catherine Elizondo, hereby declare that:

(1). I am a citizen of the United States and a resident of Brentwood, California.

(2). I am employed by the University of California at the Lawrence Livermore National Laboratory as a Business Development Executive in the Industrial Partnerships and Commercialization office and I have been employed by the University of California at the Lawrence Livermore National Laboratory from 1998 to the present.

(3). The publications described below state that the explosives detector called the Easy Livermore Inspection Test for Explosives or ELITE has been licensed to Field Forensics Inc. Copies of the publications are attached.

A. The May 4, 2006 issue of the *Valley Times* newspaper states, "The lab has licensed the technology to Field Forensics Inc. of St. Petersburg, Fla."

B. The May 4, 2006 News Release "Screening tool to help detect explosives nets technology transfer award for LLNL researchers" by the Lawrence Livermore National Laboratory states, "The technology has been licensed to Field Forensics Inc., a St. Petersburg, Fla., company, and went on the market last October."


C. The May 12, 2006 article "New screening tool helps to detect explosives" states, "The technology has been licensed to Field Forensics Inc., a St. Petersburg, Fla., company, and went on the market last October."

D. The June/July issue of Innovation: America's Journal of Technology Commercialization states, "Field Forensics, Inc. responded to a Federal Business Opportunities announcement of the ELITE licensing opportunity and was chosen as the licensee."

(4). I confirm that the explosives detector called the Easy Livermore Inspection Test for Explosives or ELITE has been licensed to Field Forensics Inc. I negotiated the license agreement between The Regents of the University of California and Field Forensics Inc. of St. Petersburg, Florida and am familiar with the technology licensed. One of the inventions licensed by the license agreement is Record of Invention IL-11088. The subject patent application IL-11088 is a patent application based upon Record of Invention IL-11088 and the subject patent application IL-11088 is one of the patent applications licensed to Field Forensics Inc. under the license agreement.

(5). I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

July 26, 2007

  
(Signature) Declarant: Catherine Elizondo

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Jeffrey S. Haas et al	Docket No. :	IL-11088
Serial No. :	10/788,558	Art Unit :	1743
Filed :	02/26/2004	Examiner :	Samuel P. Siefke
For :	EXPLOSIVES TESTER		

DECLARATION UNDER 37 CFR §1.132

Declaration by Eddie E. Scott

Commissioner of Patents and Trademarks  
Alexandria, VA 22313-1450

Dear Sir:

I, Eddie E. Scott, hereby declare that:

(1). I am a citizen of the United States and a resident of Danville, California.

(2). My education includes: Bachelor of Science Degree, University of Wyoming; Master of Science Degree, University of Texas at Dallas; Juris Doctor Degree, University of Wyoming; Patent Office Academy, Basic and Advanced, United States Patent and Trademark Office, Washington, D.C.

(3). In the Office Action mailed May 16, 2007, in the subject application, claims 1-24 were rejected under 35 U.S.C. §103(a) as being unpatentable over the cited references.



(4). I am employed by the University of California at the Lawrence Livermore National Laboratory as Assistant Laboratory Counsel and I have been employed by the University of California at the Lawrence Livermore National Laboratory from May 1, 1999 to the present.

(5). I am empowered to act on behalf of the owner of the subject application, The Regents of the University of California, and my responsibilities as Assistant Laboratory Counsel include the legal aspects of patent license agreements, invention development, invention commercialization, and patent application preparation and prosecution.

(6). The publications described below state that the explosives detector called the Easy Livermore Inspection Test for Explosives or ELITE has been licensed to Field Forensics Inc. Copies of the publications are attached.

A. The May 4, 2006 issue of the *Valley Times* newspaper states, "The lab has licensed the technology to Field Forensics Inc. of St. Petersburg, Fla."

B. The May 4, 2006 News Release "Screening tool to help detect explosives nets technology transfer award for LLNL researchers" by the Lawrence Livermore National Laboratory states, "The technology has been licensed to Field Forensics Inc., a St. Petersburg, Fla., company, and went on the market last October."

C. The May 12, 2006 article "New screening tool helps to detect explosives" states, "The technology has been licensed to Field Forensics Inc., a St. Petersburg, Fla., company, and went on the market last October."

D. The June/July issue of *Innovation: America's Journal of Technology Commercialization* states, "Field Forensics, Inc. responded to a Federal Business Opportunities announcement of the ELITE licensing opportunity and was chosen as the licensee."

(7). I have reviewed the license agreement between The Regents of the University of California and Field Forensics Inc. of St. Petersburg, Florida. I confirm that the explosives detector called the Easy Livermore Inspection Test

for Explosives or ELITE has been licensed to Field Forensics Inc. One of the inventions licensed by the license agreement is Record of Invention IL-11088. The subject patent application IL-11088 is a patent application based upon Record of Invention IL-11088 and the subject patent application IL-11088 is one of the patent applications licensed to Field Forensics Inc. under the license agreement.

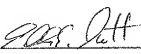
(8). The Easy Livermore Inspection Test for Explosives or ELITE technology that includes the invention of claims 1-24 of the subject application has: (A) won a 2006 R&D 100 Award and (B) won a Federal Laboratory Consortium for Technology Transfer (FLC) Award for Excellence in Technology Transfer. The publications described below provide information about the 2006 R&D 100 Award and the Federal Laboratory Consortium for Technology Transfer (FLC) Award for the Easy Livermore Inspection Test for Explosives or ELITE technology that includes the subject application and the invention of claims 1-24 of the subject application. Copies of the publications are attached.

A. The article "Pocket-sized Test Detects Trace Explosives," in the October 2006 issue of Science & Technology Review (S&TR) contains the following statements: "The E.L.I.T.E. card technology was developed by a team of scientists and engineers from the Laboratory's Forensic Science Center (FSC) and Center for Energetic Materials. Led by FSC deputy director John Reynolds, the team won a 2006 R&D 100 Award for the new technology."

B. The article "FLC's Tech Transfer Award Winners" in the June/July issue of Innovation: America's Journal of Technology Commercialization" contains the following statements: "More than 700 laboratories and research centers—representing almost all federal departments and agencies—conduct over \$100 billion in research and development annually and employ more than 100,000 scientists and engineers. The Awards for Excellence in Technology Transfer are presented each year to FLC member laboratories and their partners for successfully transferring federally developed technologies. "Lawrence Livermore National Laboratory ELITE: Easy Livermore Inspection Tester for Explosives Summary: A disposable, portable, highly accurate explosives detector. The ELITE detection card is highly sensitive to more than 30 explosives, making it one of the most effective detection systems available."

(8). I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: August 8, 2007

  
(Signature)      Declarant:      Eddie E. Scott

Valley Times  
May 04, 2006  
Also appeared San Jose Mercury News

Area lab creates small, easy explosives-detection device

Livermore Laboratory's credit card-sized tool is in high demand from military, police officers

Betsy Mason

Lawrence Livermore Laboratory has made explosives detection easier with a new credit-card sized kit that is cheap, easy and works in just minutes.

With terrorism fears running high since the Sept 11, 2001 terrorist attacks, detecting explosives is an even bigger priority for law enforcement and military personnel. Building on years of research with explosives detection in a laboratory setting, a team led by Livermore chemist John Reynolds grouped existing technology into a compact, stable package that could easily fit into the glove box of a police cruiser or a soldier's field pack.

The new detector is just two inches by three inches and slightly thicker than a credit card. Each kit will cost around \$25 and can generate results from one test in between one and four minutes.

The lab has licensed the technology to Field Forensics Inc. of St. Petersburg, Fla. On the market since October, customers include the U.S. Army and Canadian and Australian police. The company has pending orders from federal and state police agencies and from nuclear power plants.

"We have been talking with the airport authorities and they're quite interested in the technology," Reynolds said. "So I expect we'll see it in airports soon."

The new kit is as sensitive and reliable as the explosives-screening machines in major airports, but it is much less expensive and faster and easier to use.

The Lawrence Livermore team had military applications in mind when its members developed the kit. The ability to hunt down bomb makers in Iraq is critical to U.S. troops, they said.

"We think this will play an integral role," said Reynolds. "If you could catch them further up in the chain, like where the bombs are made, you'd actually be able to mitigate more attacks."

The kit can detect more than 30 different explosives. It contains a swipe that is used to wipe a suspect surface and then be re-inserted into the kit. A tiny glass vial full of chemicals is then broken inside the card, and if TNT is present, the swipe will change color. If there is no reaction, a second vial can be broken that will detect other types of explosives.

The new detector is called the Easy Livermore Inspection Test for Explosives, or ELITE.

The lab's researchers on the ELITE project were honored Wednesday night with a Federal Laboratory Consortium award for excellence in technology transfer that was presented during an awards ceremony in Minneapolis.

## Lawrence Livermore National Laboratory

### News Release

Contact: Steve Wampler  
Phone: (925) 423-3107  
E-mail: wampler1@llnl.gov

FOR IMMEDIATE RELEASE  
May 4, 2006  
NR-06-05-02

## Screening tool to help detect explosives nets technology transfer award for LLNL researchers

LIVERMORE, Calif. — Airport screeners, law enforcement and military personnel and others have a new ally in the war against terrorism — a portable, sensitive and accurate explosives detector developed by Lawrence Livermore National Laboratory researchers.

The new explosives detector, called the Easy Livermore Inspection Test for Explosives, or ELITE, is highly sensitive to more than 30 different explosives, making it one of the most effective explosive detection systems available, said John Reynolds, who led the technology's development and is the deputy director of LLNL's Forensic Science Center.

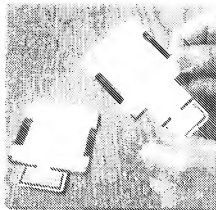
"Our goal is to develop new technology or take existing technology, make it better, and then adapt it for use in the field," Reynolds said.

Using the ELITE card, airport screeners, border patrol agents, security agents, first responders, police and military personnel and others can secure real-time analysis — within the space of one to four minutes — whether explosives are present, according to Reynolds.

The ELITE card was honored last night with a Federal Laboratory Consortium (FLC) award for excellence in technology transfer, presented to LLNL researchers during an awards dinner at the Minneapolis Marriott City Center.

The technology has been licensed to Field Forensics Inc., a St. Petersburg, Fla., company, and went on the market last October.

Already, the firm has picked up a host of customers, including the U.S. Army, the Royal Canadian Mounted Police, the Ontario Provincial Police, the Canada Air Marshals, the Queensland Police from Australia and others, said Field Forensics President Craig Johnson.



Lawrence Livermore National Laboratory

The LLNL-developed ELITE explosives detector is designed for one-time use and can be disposed of as regular (non-hazardous) waste. Several of the devices can fit easily into a shirt pocket and can be used, for example, on vehicle door handles during routine traffic stops, on surfaces and door handles of suspicious parked vehicles, or on suspicious packages. The sample is tabbed for ease of handling and to allow recording of date, time, and sample location information.

Orders also are pending from several military agencies, federal and state police agencies and some commercial nuclear power plants, Johnson said.

"When it was announced that the ELITE explosives detection technology was going to be made available for licensing, we jumped at the opportunity," Johnson said. "ELITE technology is exactly that which our customers have been telling us they need: it's self-contained, small, light, disposable, easy to operate and inexpensive."

Reynolds echoes Johnson's points about the ELITE card's advantages, noting the technology is light (weighing a fraction of an ounce), small (the size of a 2-inch by 3-inch index card), inexpensive (costing less than \$25, substantially less in higher quantities) and stable (with a shelf life of about two years).

"It gives you a chance to detect explosives faster, cheaper and easier," Reynolds said. "That allows more law enforcement, military, airport security and others to have a better chance to catch the bad guys."

In Reynolds' view, the ELITE card could provide an important assist to the U.S. military in Iraq and on other fronts. "In Iraq, it could be used for finding bomb-makers, vehicles used to transport explosives or to find anyone in the chain of making improvised explosive devices.

"With great demand for travel in the industrial world, there is an increasing need for safe transportation within the United States and overseas," Reynolds said. "Significant issues involving explosives detection are cost, sensitivity and convenience. The ELITE detection alleviates all these concerns by providing a fast, reliable and convenient system that is easy to use."

To use the ELITE detection card, the suspect surface -- whether hands, a vehicle or luggage -- is wiped with a swipe. The swipe is replaced into the card and a small glass vial, or ampoule, is broken. If TNT-based explosive materials are present, the swipe will change color to indicate a positive reading. If the swab remains colorless and explosives are still suspected of being present, a second ampoule is broken, again looking for a color change that would indicate the presence of other types of explosives.

Development of the ELITE technology was achieved by a team of scientists from the Lab's Forensic Science Center, in partnership with LLNL's Energetic Materials Center, under research grants sponsored by the Department of Energy and the National Nuclear Security Administration. The work started in October 2003 and cost about \$1.5 million.

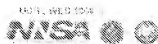
The Federal Laboratory Consortium for Technology Transfer (FLC) is a nationwide network of federal laboratories that provides the forum to develop strategies and opportunities for linking the laboratory mission technologies and expertise with the marketplace.

Organized in 1974 and formally chartered by the Federal Technology Transfer Act of 1986, the FLC consists of more than 700 major federal laboratories and centers and their parent departments and agencies.

Founded in 1952, Lawrence Livermore National Laboratory has a mission to ensure national security and to apply science and technology to the important issues of our time. Lawrence Livermore National Laboratory is managed by the University of California for the U.S. Department of Energy's National Nuclear Security Administration.

**More Information:**

- LLNL's Public Affairs Office ([www.llnl.gov/pao/](http://www.llnl.gov/pao/))
- LLNL's Forensic Science Center (<http://www.llnl.gov/about/fsc.html>)
- "Forensic Science Center Maximizes the Tiniest Clue"  
*Science & Technology Review*, April 2002 ([www.llnl.gov/stf/Apr02/Andresen.htm](http://www.llnl.gov/stf/Apr02/Andresen.htm))



Lawrence Livermore National Laboratory  
7000 East Avenue, Livermore, CA 94550

Lawrence Livermore National Laboratory  
University of California, Berkeley, CA 94720-8080  
Lawrence Livermore National Laboratory  
94550-8080

## **ELITE Forensic Explosive Material Detection Device for Law Enforcement, Commercial, Military, Airline and Homeland Security**

**Field Forensics Inc. (FFI)** manufactures innovative and reliable, disposable explosives and gun shot residue detection kits. FFI also manufactures SPME (Solid Phase Micro-Extraction) technology products for field sampling and lab analysis of explosives, drugs, accelerants, and toxins.

**FFI** is dedicated to producing practical and robust detection devices for use in homeland security and law enforcement.

**E.L.I.T.E.™** is a new technology for explosives and gun shot residue detection manufactured and distributed internationally by **FFI**.

**E.L.I.T.E.™ Model EL100** is a simple, quick, and cost-effective, explosives detection kit. **E.L.I.T.E.™ Model EL100** detects PETN, RDX, and HMX, ammonium nitrate and more than forty other compounds used in commercial, military, and improvised explosives.

### **E.L.I.T.E.™ Model EL100 Explosive Detection Kit**

Quick – results in 90 seconds or less

Simple – designed for use by non-specialists

Tough – long life in extreme environmental conditions

Sensitive – up to 10,000% more sensitive than other kits

Field-tested and effective, **E.L.I.T.E.** is currently in use with many military, law enforcement, homeland security and commercial security groups.

**E.L.I.T.E.™ Model EL100** is the winner of the R&D 100 Award for 2006 and is also a winner of the US Federal Laboratory Consortium's



**R & D 100  
AWARD WINNER  
2006**



Excellence in Technology Transfer Award.

**FFI** has offices and agents worldwide including the United States, Canada, Hong Kong, Singapore, Japan, Australia, Egypt, United Arab Emirates, Saudi Arabia, the United Kingdom, Spain, Scandinavia and South America.

[Home](#) · [Explosives Detection](#) · [S. P. M. E.](#) · [Tech Data & Links](#) · [New](#)  
| [Contacts Worldwide](#)

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You will be held liable for statutory damages as high as \$150,000 for each occurrence as set forth in s  
(c)(2) therein.

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Horizon Web Design, SEC & Hosting by Digital Rei, Inc.

## **Explosive Detection Device for Commercial Protection, Military Security and Homeland Defense**

### **Affordable, Effective, Reliable, Ultra-Portable & Disposable**

For several years Field Forensics, Inc. (FFI), in response to the demands of its commercial security, homeland defense and military clients, had been searching for the explosives detection technology that could be universally deployed in the fight against terrorism.

In response to these demands, FFI recently introduced the E.L.I.T.E.<sup>™</sup>, Model EL100, Explosives Detection Kit. Developed in cooperation with one of the USA's top national research laboratories, the EL100 finally allows a pocket-sized, disposable, low-cost, reliable, robust, and easy-to-use explosives detection device. Field Forensics, Inc. has now made E.L.I.T.E.<sup>™</sup> Technology commercially available. The EL100 exceeds existing kits in:

- 1.Detection Capability:** detects 50% more types of explosives
- 2.Sensitivity:** is up to 10,000% more sensitive
- 3.Reliability:** has at least twice the shelf life of many existing kits
- 4.Ease of Use:** there are no bottles or vials -- it is NOT a miniature chemistry lab



**R & D 100**  
**AWARD WINNER**  
**2006**

**The explosives detection process with the E.L.I.T.E.<sup>™</sup> is quick:**

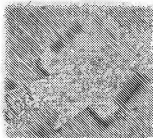
**Step 1. Remove swab**



**Step 2. Rub surface**



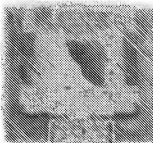
**Step 3. Re-insert swab**



**Step 4. Snap 'A'**



**Step 5. High-color result**



While sensing instruments such as "sniffers" and other devices have their place, they are simply too expensive, too cumbersome, and sometimes too unreliable to be fielded in significant numbers. Also, since many explosives do not have much of a vapor signature, sniffers will have limited utility in detecting them.

The E.L.I.T.E. ® EL100 reliably detects the presence of explosives and propellants. It is self-contained, with only a small optional heating system such as a butane lighter or battery-powered heater. To collect a sample, the EL100 swab is rubbed on the suspect area, object or person and then placed back into the card for testing. Two sealed ampoules containing very small amounts of chemicals are ruptured in a specific order. These chemicals create a very visible color change in the presence of a broad range of military, commercial and inorganic explosives and propellants. The entire test takes less than 90 seconds.

**Some examples of positives for TNT, Tetryl, 2,6 DNT, RDX and ANFO (left to right):**



The EL100 detects dozens of explosives – military, commercial, and those made by would-be terrorists.



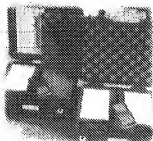
#### **Model EL100-BPH**

**Battery Powered Heater** – portable heating device for EL100. The portable heater operates on NiMH rechargeable batteries and is designed to operate for an eight-hour shift of normal, intermittent usage. It extends the range of the EL100 and improves sensitivity.



#### **Model EL100-BLH**

**Heating Jig** – the heating jig is designed for use with an open flame such as a cigarette lighter of some sort. The jig folds on itself for easy storage. It extends the range of the EL100 and improves sensitivity.



### Model EL101 Field Kit

**Field Kit** - hard-sided field kit includes ten EL100 kits, one each EL100-BPH and EL100-BLH, EL100-FG Field Guide (weatherproof).



### Model EL102 Field Kit

**Field Kit** - soft-sided field kit includes ten EL100 kits, one each EL100-BPH and EL100-BLH, EL100-FG Field Guide (weatherproof).

ELITE is made in the USA. Patents Pending.

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# REMINDER



Edward N. Bachand  
bachand.edward@dorsey.com

March 11, 2008  
~~February 27, 2008~~

James S. Tak  
Lawrence Livermore National Laboratory  
P.O. Box 808, L-703  
Livermore, CA 94551-9900

Re: U.S. Patent Application for *APPARATUS FOR STOPPING A VEHICLE*  
Your Ref. IL-10958B DIV.  
Our File No. A-71134-1/ENB (464469-6)

Dear James:

Enclosed is a copy of an Advisory Action for the referenced matter. As noted therein, the Amendment After Final filed January 25, 2008 and Supplemental Amendment filed January 29, 2008 were not entered because it was deemed to raise new issues which would require further consideration and/or search and not to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

Please advise us by **March 10, 2008** whether or not you wish for us to file Request for Continuing Examination by the March 25, 2008 deadline for filing our appeal brief.

Should you have any questions on this matter, please do not hesitate to contact me.

Sincerely,

DORSEY & WHITNEY LLP



Edward N. Bachand

ENB/llm  
4830-4012-2882\1

Enclosures

cc: Willard H. Wattenburg (w/encl.)  
Teresa Walls, Lawrence Livermore National Laboratory



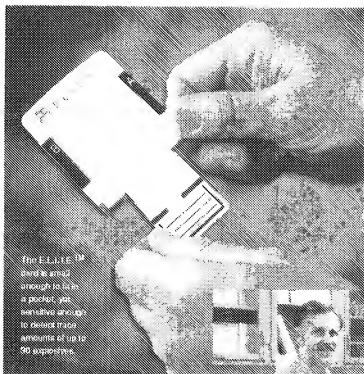
# POCKET-SIZED TEST DETECTS

**SECURITY** Everywhere throughout the world need detection tools that can quickly and accurately locate small amounts of explosives. Technology developed by Lawrence Livermore will provide emergency response, law-enforcement, and military personnel

with an easy-to-use explosives detector, small enough to carry in a shirt pocket. This technology, called ELLITE™ (Easy Livermore Implosion Test for Explosives), is inexpensive and requires minimal training for deployment.

ELLITE cards are particularly useful for screening vehicles, containers, and people for explosives residue. The 5-by-7.5-centimeter card weighs about an ounce, and test results are available immediately in the field. After a card has been used, it can be discarded without special handling.

The ELLITE card technology was developed by a team of scientists and engineers from the Laboratory's Explosive Science Center (ESC) and Center for Explosive Materials. Led by ESC deputy director John Reynolds, the team won a 2005 R&D 100 Award for the new technology. The product, which also received a 2006 Excellence in Technology Transfer Award from the Federal Laboratory Consortium, is marketed by Field Forensics, Inc., of Florida. Since October 2005, when units became commercially available, Field Forensics has sold ELLITE cards to many government agencies, including the Department of Homeland Security, New York State Police, Royal Canadian Mounted Police, and Queensland, Australia, Police.



The ELLITE™ card is small enough to fit in a pocket, yet sensitive enough to detect trace amounts of up to 99 explosives.

Livermore members of the ELLITE™ development team (from left to right): Ronald Simpson, John Reynolds, J. Del Eckert, and Peter Hanco.



Lawrence Livermore National Laboratory

# TRACE EXPLOSIVES

## Inexpensive Cards with Built-In Simplicity

Each E.L.I.T.E. card is good for one test. To collect a sample, a user removes the swipe from the card, rubs it on a suspect area—a shoe, car door, or suitcase—and slides it back into the card. The user then ruptures two sealed ampoules that contain the developing chemicals. A few drops of the reagent flow onto the swipe through microchannels fabricated in the card's plastic case. Within a minute, an explosive vapor, if present, will appear as a brightly colored spot on the white swipe.

The color and intensity of the spot indicates the type and concentration of the explosive found. Explosives, generally shown up as bright red or pink, so they are easy to distinguish from dirt and other gray substances. The chemical formulations used in E.L.I.T.E. cards can detect military and commercial explosives, such as C-4, Semtex, TNT and derivatives, as well as inorganic explosives and propellants, such as ammonium nitrate and black powder. A user card requires no special handling and can be disposed of as regular trash.

The ease of detection technology is a critical issue for many security organizations, and E.L.I.T.E. offers an affordable product. Cards cost \$19 to \$20 each, other commercially available screening systems can range from \$49 to \$7,500. But cost is not the only advantage. "We developed a reagent formulation with a dramatically improved shelf life," says Reynolds. "E.L.I.T.E. units have a much longer service life than comparable products." Summit screening products have an average shelf life of one year or less.

Once in service, these detectors to last remain effective for one to four months. The E.L.I.T.E. reagents, however, have an indefinite shelf life and do not have to be replaced frequently.

The E.L.I.T.E. card also has a lower detection limit than other screening products and can detect more than

30 types of explosives and propellants. In addition, reagents are self-contained in each card, so users are not as exposed to these chemicals. Other detection technologies, typically store reagent in separate bottles, and users must spray the formula onto a swipe or otherwise apply it by hand. This approach not only exposes users to chemicals but also can be difficult to use in unattended locations.

Reynolds notes that other explosives detection kits can be cumbersome or require users to follow complicated procedures.

"The E.L.I.T.E. card solves this problem," he says. "Instructions are printed right on the card, so user error is largely eliminated. Plus, the engineers' design, regardless the proper amount of chemicals, each time."

## Potential to Save Lives

E.L.I.T.E. cards operate effectively in harsh environments, so the technology could be adapted for military use, such as to screen materials in combat zones. Other applications include border inspection, airport and transit security, and decontamination facilities.

The cards' potential to save lives is also clear. "Explosives will continue to be a potent weapon of choice as long as they are available in a viable form," says Reynolds. "E.L.I.T.E. cards provide security personnel with a fast, effective method to detect explosives and deter them." These sensitive, robust explosives detectors offer an enormous potential for saving the lives of civilians and military and law-enforcement personnel.

—John Parker



**Key Words:** Easy, Low-cost, Inexpensive Test for Explosives  
E.L.I.T.E.™ Card, explosives testing, R&D 100 Award

For further information contact John Reynolds at (925) 422-6020  
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### FLC AWARDS - 2006

#### AWARDS FOR EXCELLENCE IN TECHNOLOGY TRANSFER DEPARTMENT OF ENERGY

#### Argonne National Laboratory

#### Ultrananocrystalline Diamond (UNCD) Coating Technology for Advanced Multifunctional Devices

The Ultrananocrystalline Diamond™ (UNCD™) coating technology, invented and developed at Argonne National Laboratory (ANL), captures many natural diamond properties in thin-film form and greatly surpasses other diamond film technologies with commercial potential.

UNCD™ films can be used in a broad and diverse range of applications from macro to nanodevices, such as energy-saving ultra-low friction and wear coatings for mechanical pump seals and tools, high-performance microelectromechanical and nanoelectromechanical system (MEMS/NEMS)-based telecommunication devices, the next generation of high-definition flat panel displays, in-vivo biomedical implants, and biosensors. Despite ANL's many interactions with industry, the nature and maturity of the technology made it unsuitable for licensing directly to established companies. Instead, the novel UNCD™ thin-film technology was successfully transferred to an ANL-founded startup company, Advanced Diamond Technologies, Inc. ([www.thindiamond.com](http://www.thindiamond.com)).

The nominees worked closely with ANL's Office of Technology Transfer, as well as officials from the University of Chicago and the U.S. Department of Energy (DOE), in founding ADT.

The pioneering technology transfer process established by the nominees has been used to create three other ANL startup companies in the past year, and it is being considered as a new model for transferring energy-related and other technologies from DOE laboratories to the private sector.

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Contact: Dr. Orlando Auciello, (530) 252-1685, [auciello@eriil.gov](mailto:auciello@eriil.gov).

## **Lawrence Livermore National Laboratory**

### **ELITE: Easy Livermore Inspection Tester for Explosives**

International terrorist activity has increased markedly in recent years, spurring demand by security agencies worldwide for efficient, accurate explosives detection capabilities. To meet this need, Lawrence Livermore National Laboratory (LLNL) perfected a disposable, portable, highly accurate explosives detector. The Easy Livermore Inspection Tester for Explosives (ELITE) is a simple, chemical-based, field useable spot-test to rapidly screen for a broad range of trace explosive materials. The ELITE detection card is highly sensitive to more than 30 explosives, making it one of the most effective detection systems available.

Using colorimetric chemistry, ELITE provides real time analysis for airport screeners, border patrol officers, security agents, and first responders, including firefighters and law enforcement.

The portable design of the ELITE does not require a fixed power source, thus making it ideal for field use. The detection card has been shown to have a high degree of sensitivity toward most explosives, with few false-negative/positive readings. The card includes a unique swipe material, chemical containing ampoules, and a separate heat generator. A first responder need only brush a suspect surface with the disposable swipe and break the ampoules to release chemical reagents onto the swipe. If the swipe changes color, explosives are present. The design of the card is uncomplicated, allowing use even in very tumultuous environments.

The ELITE detection technology was developed and tested in LLNL's Forensic Science (FSC) and Energetic Materials Center and was transferred to Field Forensics, a small Florida company that develops tools to serve first responders and lab technicians who require rapid testing results. Field Forensics is manufacturing 500 ELITE cards for DHS and began delivery in October 2005. In autumn 2005, Field Forensics introduced the ELITE detection card and associated technology to a broader audience at an annual security conference attended by many state law enforcement agencies.

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## **Los Alamos National Laboratory**

### **PowerFactorE**

Who could imagine that Procter & Gamble (P&G), one of the nation's largest consumer product manufacturing enterprises, would turn to one of the nation's most eminent—and secretive—weapons design labs for help with its diaper production line? But this is precisely what happened. The outcome of this surprising collaboration is known as PowerFactorE, a comprehensive approach to reducing operating costs and minimizing capital expenditures for manufacturing operations. PowerFactorE enables manufacturers to predict, prevent, and reduce reliability losses, equipment failures, and repair downtime. Adopted throughout P&G's global manufacturing network, PowerFactorE has saved

more than \$1 billion in operating costs since its implementation. In 2003, R&D Magazine selected PowerFactorRE for an R&D 100 Award as one of the world's 100 scientific and technological advances to show the greatest commercial potential in the preceding year. In 2004, PowerFactorRE received a Council for Chemical Research Award for government/industry collaboration.

Los Alamos National Laboratory (LANL) weapon engineers were excited by the challenges posed by a huge commercial manufacturing production line—one with hundreds of real-world variables for testing their computational and analytical prowess. And while they came from vastly different worlds, LANL and P&G discovered they spoke a common language—reliability engineering. LANL produces nuclear deterrents that must work perfectly. P&G must maintain high quality to retain its customers. The two signed a Cooperative Research and Development Agreement (CRADA) to conduct reliability modeling using P&G data and LANL expertise.

PowerFactorRE, the product of this CRADA, comprises a unique toolkit of proven reliability engineering methods, statistical and analytical tools, simulation software, customized procedures, and training to help manufacturing line managers understand reliability losses and prevent problems before they occur.

Using PowerFactorRE, P&G has transformed manufacturing efficiencies on its assembly lines producing consumer products ranging from diapers to detergents. P&G has reduced operating failures in more than 200 plants worldwide. Since implementing the system globally, P&G has increased plant productivity up to 44%; cut controllable costs by as much as 33%; improved equipment reliability between 30% and 40%; reduced line changeover time from hours to minutes; and achieved 60% to 70% faster new product startups. Other manufacturers are realizing the same advantages by licensing the PowerFactorRE toolkit from P&G and its marketing partners, BearingPoint and Zarcap Inc.

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### **National Nuclear Security Administration - Kansas City Plant**

#### **Improved Method to Separate and Recover Oil and Plastic**

The Kansas City Plant developed a process that uses liquid and supercritical carbon dioxide to blast oil residue off of empty plastic motor oil bottles. With this process, which produces no waste streams, both the residual oil and clean plastic can then be reused.

The Kansas City Plant patented this process and licensed the technology to Itec Environmental Group, which used it to develop a plastics recycling system called the ECO2. Itec has been able to use this system to recycle not only motor oil bottles, but almost every other type of consumer plastic as well. ECO2 has proven to be superior to conventional plastic recycling methods because it produces no waste, generates cleaner and more marketable plastic, and can recover residual oil for recycling, which no other system can do.

Propelled by the Kansas City Plant's cleaning technology, Itec's ECO2 system surpasses other methods of plastics recycling for several reasons. Most importantly, the liquid carbon dioxide and special solvent it uses are both reusable, so ECO2 does not create any wastestreams, unlike water-wash systems that collectively discharge 100 billion gallons of contaminated water into the environment each year. And because it has no environmental impact, special waste permits are not required to set up an ECO2 recycling facility, which makes it less costly to start up. Overall, the ECO2 system costs 30% less to operate than traditional water-wash recycling systems, which provides for higher profit margins due to decreased operating costs.

Not only is the ECO2 system more environmentally friendly and less expensive, but it creates a better product. Though originally intended for cleaning used oil bottles, this technology can completely remove glue, labels, oil and dirt from plastic containers as well. It also eliminates all odors, making the plastic cleaner, more marketable and more profitable than plastics cleaned with water-washing. ECO2 generates FDA-approved clean plastics, which are in high demand in the plastics industry, especially for use in produce packaging.

Because of this technology transfer effort, Itec has been able to commercialize the ECO2 recycling method and start up a promising new company that has captured the interest of both the plastics industry and environmental waste management organizations.

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## **Pacific Northwest National Laboratory**

### **Breakthrough Treatment for Prostate Cancer**

This technology transfer story epitomizes the value of a national laboratory in enabling a small business to develop its breakthrough cancer therapy technology to the point where it is helping treat and cure cancer patients. Pacific Northwest National Laboratory (PNNL) provided access to equipment and two user facilities in a unique way to transfer its radiological expertise to IsoRay Medical, Inc. (IsoRay) of Richland, Washington, to enable the successful launch of its commercial product. IsoRay is producing a powerful new kind of brachytherapy seed made from cesium-131 (<sup>131</sup>Cs) for treating prostate and other cancers.

Through access to specialized PNNL facilities, equipment, and expertise under a variety of collaborative agreements between IsoRay and PNNL since 1998, researchers from both organizations contributed to the development of the brachytherapy seed and associated fabrication process. This brachytherapy seed uses <sup>131</sup>Cs, which has a low-energy x-ray that effectively provides a cancer-killing dose to a tumor in a short period of time. In the October 13, 2005 Business Wire, IsoRay's <sup>131</sup>Cs brachytherapy seed is described as a "breakthrough" and "the biggest advancement in seed brachy-therapy since the introduction of palladium-103 19 years ago."

IsoRay, which became a publicly owned company in July 2005, started the effort to produce the seeds commercially using PNNL's Radiochemical Processing Laboratory (RPL) in May 2004 under the current agreement with PNNL. Such an arrangement provided

critical and timely national laboratory support for IsoRay in working toward a commercial production facility of its own. In October 2004, the world's first 131Cs seed implant was performed at the University of Washington Medical Center in Seattle. Since then, approximately 90 patients have been implanted to treat, and hopefully cure, prostate cancer using 131Cs seeds. 131Cs brachytherapy procedures are currently available at 17 treatment centers in 13 states. IsoRay is currently housed in a PNNL- and Department of Energy-sponsored and supported incubator user facility, the Applied Process Engineering Laboratory. The company conducts its production operations under a first-of-its-kind arrangement with PNNL using the RPL to process and purify source material, manufacture its product, and qualify it under stringent Food and Drug Administration standards.

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larry.greenwood@pnl.gov

### **Pacific Northwest National Laboratory**

#### **Improving Medical Care and Saving Lives with Bioactive Thin-Film Coatings**

Researchers at Pacific Northwest National Laboratory (PNNL) developed the first-ever water-based process that allows calcium-phosphate thin-film coatings containing controlled-release bioactive therapeutic agents to be deposited on orthopedic devices and other medical implants, such as catheters and stents.

Benefits to the 750,000 implant recipients each year are twofold: 1) the antimicrobial agent in the coating has been proven in tests to kill bacteria or greatly inhibit its growth in the body, helping to prevent dangerous and costly post-surgical infections, and 2) the water-based deposition process coupled with the bioactive antimicrobial agent provides an advanced method for applying thin films containing calcium-phosphate coatings—a natural component of bone—to artificial joints, allowing for enhanced bone bonding and helping to avoid rejection of the implant by the body. The thin-film technology received two patents in the late 1990s, and subsequent animal testing by U.S. Army orthopedic surgeons provided PNNL researcher Dr. Allison Campbell and Commercialization Manager Dr. Eric Jurrus with the preclinical data needed to market the technology to medical device companies. The marketing-to-licensing process encompassed four years of intense effort, dedication, and overcoming obstacles. PNNL ultimately forged a relationship with Bacterin, a medical device testing laboratory for medical implant manufacturers. The technology was licensed in 2004 by Bacterin, which has since made *Fortune* magazine's top 25 breakout companies in 2005.

Bacterin recently joined forces with the Department of Defense, receiving a \$1.4-million appropriation to coat metal rods and pins with the technology for use in the battlefield. In addition, Bacterin has forged new relationships with three medical device manufacturers—Baxter International, C.R. Bard, and Cook—who have agreed to use the unique coating on their products. Bacterin expects its revenues to rise by \$16 million this year, according to *Fortune*.

Bacterin began production of the technology in 2005 with a handful of coated medical devices now ready for manufacture.

This technology will play a major role in dramatically reducing post-surgical infections in implant recipients and wounded military personnel, and will greatly increase acceptance of artificial joints by the body.

Preventing these infections promises billions of dollars of savings to patients and the U.S. government in follow up medical care. In addition, significant cost savings and reduced environmental impact will be realized in the manufacturing process, as the simplified water-based deposition process does not require use of multi-million dollar instruments and uses very few hazardous materials.

Contact: Dr. Allison A. Campbell, (509) 376-6688,  
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### **Pacific Northwest National Laboratory**

#### **Self-Assembled Monolayers on Mesoporous Silica (SAMMS) Technology for Mercury Reduction**

Mercury contamination poses a serious threat to the environment and human health. Researchers from Pacific Northwest National Laboratory (PNNL) have developed an innovative technology that quickly and easily reduces or removes mercury content without creating hazardous waste or by-products, and that can be disposed of as a non hazardous waste. SAMMS is simple, inexpensive and easy to use; it is highly adaptable for use in reducing and removing other contaminants from soil and water; and it has numerous applications, including water treatment, waste stabilization, and metal processing and finishing. It is also significantly faster, more effective, and far less expensive than other mercury removal methods used in the past. The PNNL team has demonstrated innovative research and incredible teamwork in developing the initial technology, and in developing adaptations to expand its applications. PNNL proactively pursued broad transfer of the technology to multiple fields of use based on a "technology portfolio" approach, which provides a source of dedicated support to research staff and management in developing opportunities to enhance or create commercial products from PNNL derived technologies. Various methods of technology transfer are employed, with the ultimate goal to provide broad-based returns from deployment of PNNL intellectual assets.

The team first researched and selected a subset of emerging environmental issues. The strategy then was to develop a portfolio of products based on the basic SAMMS technology. The initial issues selected included treatment of arsenic in drinking water and treatment of mercury associated with industrial processes and wastes. In each area, the team conducted "proof-of-principle" experiments to demonstrate the viability of SAMMS as a potential solution. The results of these experiments were then documented in a variety of ways, including brochures, the SAMMS website, presentations at selected industrial conferences, and technical literature. Then opportunities were sought to present information about the technology to appropriate audiences and relationships with industry partners such as Steward Advanced Materials, Chevron (formerly Unocal), Molycorp, and PECO were developed.

Articles on the technology have been featured in numerous high-profile scientific, technical and trade publications, including



*Science, Environmental Health Perspectives, TechComm magazine, Environmental Science & Technology, Water and Wastewater magazine, Small Time, and even Business Week. The technology was honored with an R&D 100 award recognizing the 100 most technologically significant products and advancements in the world, and was a finalist in the environmental category in Discover magazine's annual awards for technological innovation.*

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richard.skaggs@pnl.gov

## **Pacific Northwest National Laboratory**

### **Starlight Information Visualization System**

The commercialization of the Starlight Information Visualization System has enabled nearly 40 entities to access and interpret information about business intelligence, consumer trends, medical records, current events, and cyber security data and to enhance their operations by exploiting the data to their competitive advantage. Some companies report saving millions of dollars in the process. These companies use Starlight to extract consumer and product information pertinent to their business operations from enormous masses of data that previously were virtually inscrutable.

Starlight is the only software that can integrate many different data types and formats, perform high-speed, high-efficiency analysis, and display the results graphically so that the relationships among the data and their implications can be quickly and easily understood. While other commercial software products support only a few predefined data types, Starlight supports the concurrent analysis of an unlimited variety of information types. Furthermore, the software combines multiple visualization techniques to enable many different aspects of large information collections to be analyzed simultaneously. This flexibility enables Starlight to address a wide range of problems that used to be difficult or impossible to interpret.

Starlight was originally developed for intelligence analysis applications, and its national security uses are still growing. But the astute and innovative researchers at Pacific Northwest National Laboratory (PNNL) who developed Starlight recognized that its capabilities were germane to many enterprises in the commercial marketplace as well and began to direct efforts to successful technology transfer. The PNNL team had a vision for this powerful software tool from the beginning. They started the technology transfer process with invention disclosures in 1997. A market analysis was performed and an aggressive business strategy established in 1999. In 2000, licensing discussions began with commercial entities, and a website was launched to describe Starlight's capabilities to a wide range of potential customers. Between 2000 and 2005, nearly 40 licenses were issued to enterprises ranging from government offices to academia, from small competitive intelligence companies to large companies such as Toyota and Procter and Gamble.

These customers consistently report that Starlight provides a higher level of visualization analytics capability than any other product on the market today. This product has found enormous success in the commercial sector.

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## **Sandia National Laboratories**

### **Robust, Wide-Range Hydrogen Sensor**

The emerging hydrogen economy will require a large number of hydrogen sensors for safety and efficiency.

Sandia National Laboratories' (SNL) Robust, Wide-Range Hydrogen Sensor is the only one of its kind to offer both low- and high-range hydrogen measurement capability on the same chip, virtually eliminating false readings and making it an ideal candidate for a variety of government and commercial applications.

Existing technologies for detecting hydrogen have numerous drawbacks. They have a limited dynamic range, poor reproducibility and reversibility, are subject to false alarms, and tend to be slow, unreliable, and difficult to use. In comparison, the SNL sensor provides: hydrogen detection over a broader range of concentrations; smaller size to allow monitoring at various points; reliable performance over greater temperature range; chip temperature maintained at constant value; and dependable operation in diverse environments (vacuum, non-oxygen ambient, extreme vibration/radiation conditions).

H2scan Corporation of Valencia, California, has licensed SNL's sensor technology and, through a formal Cooperative Research and Development Agreement (CRADA), has developed a small in situ sensor with the capability of detecting hydrogen concentrations between 10 parts per million (ppm) and 100%. Today, H2scan has three retail products in commercial use and has delivered sensors to over 200 government and industry customers, including a classified Department of Energy plant in Idaho Falls, Idaho.

This new technology provides customers with an inexpensive hydrogen sensor that essentially eliminates false readings by detecting the presence of hydrogen, with or without oxygen, against virtually any background gas. The sensor is applicable to the automotive industry, the hydrogen production market, the petrochemical industry, nuclear waste monitoring, government, and companies with an interest in monitoring hydrogen levels in transformers. Four additional patents have been filed by H2scan, including foreign patent protection.

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## **Sandia National Laboratories**

### **SMART: Sensor for Measurement and Analysis of Radiation Transients System**

Researchers at Sandia National Laboratories (SNL) have developed a new tool in the fight against terrorism. The Sensor for Measurement and Analysis of Radiation Transients—or SMART—system uses detectors and software to distinguish between normally occurring radioactive materials and potential signatures of terrorist activities. SNL's proprietary software is the key to the technology's success. The software helps operators

easily and accurately identify the isotopes associated with radiological emissions. The system operates in real time and indicates the level of confidence (low, fair, high) that the material has been correctly identified. A video imager captures an image of the person or vehicle carrying the radioactive material when the detector alarms.

SNL licensed its FitToDB and PASSBY software technology and its GADRAS-LT software to Thermo Electron in 2003 and 2004, respectively. The company is incorporating the software technology into existing Thermo Electron hardware platforms with the plan of delivering third-generation systems to the market. Under a Cooperative Research and Development Agreement (CRADA) signed in mid-2005, SNL and Thermo Electron also collaborated on refinement of the SNL-developed software for large-scale commercial deployments in Thermo Electron's advanced spectroscopic portal system.

The SMART system will be a key component in the protection of military assets and the homeland against the threat of dirty bombs and other nuclear devices. The system, when fully commercialized and proven, can be deployed at seaports, airports, border patrol stations, government buildings, military bases, and other environments that could be targets for terrorist radiological attacks.

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## **Sandia National Laboratories**

### **SUMMIT V™ Fabrication Process and SAMPLES™ Program**

Sandia National Laboratories' (SNL) Ultraplanar, Multilevel MEMS Technology (SUMMIT™) fabrication process is a MicroElectroMechanical Systems (MEMS) batch fabrication process that uses conventional integrated circuit processing tools to achieve high volume, low cost MEMS production. SNL's SUMMIT V™ technology is unique in that it is the only MEMS technology currently available that offers four levels of structural polycrystalline silicon (poly) and an electrical poly level isolated from the silicon substrate and that is fabricated using traditional integrated circuit processing techniques.

Micromachined polysilicon has excellent mechanical properties—it is stronger than steel, extremely flexible, and does not readily fatigue. The design flexibility in a five-layer technology is staggering. Examples include photonic communications, wireless communications, automotive accelerometers, lab-on-chip systems, and smart sensors for myriad applications, such as chemical- biological sensors and micro-fluidic devices. Additionally, devices for applications that have not yet been imagined are now a possibility.

To facilitate MEMS education and access to its cutting-edge SUMMIT™ process technology, SNL launched the Sandia Agile MEMS Prototyping Layout Tools, Education and Services (or SAMPLES™) Program in 2001. The objective of the SAMPLES™ Program is to enable customers to develop their own innovative MEMS-based products by leveraging advanced design, fabrication (utilizing the baseline SUMMIT IV™ and V™ technologies), and characterization technologies originally developed for federal laboratory applications. Program participants can attend short

courses, purchase design and visualization software and, ultimately, have those designs fabricated at SNI through a cost-shared program. This approach reduces cost and risk and thus opens the door to a larger market, facilitating the realization of prototypes and a better understanding of MEMS in general.

To date, the SAMPLES™ Program has enabled the fabrication of 145 individual modules of partner designs using the SUMMIT™ technology. The program has also generated 49 Work for Others agreements and over 75 software licenses related to the SUMMIT™ fabrication processes. Over 800 students representing dozens of companies, universities, and national laboratories have participated in SAMPLES™ classes.

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# innovation:

## FLC's Tech Transfer Award Winners

June/July 2006

More than 700 laboratories and research centers—representing almost all federal departments and agencies—conduct over \$100 billion in research and development annually and employ more than 100,000 scientists and engineers. The Awards for Excellence in Technology Transfer are presented each year to FLC member laboratories and their partners for successfully transferring federally developed technologies.

Following are those recognized at this year's conference held in May in Minneapolis.

### Department of Agriculture

#### \*Agricultural Research Service, Mid South Area

Vaccines for the prevention of two major catfish diseases.

**Summary:** The modified live vaccine team demonstrated exceptional creativity in the invention and transfer of the first U.S. modified live vaccines that protect channel catfish from enteric septicemia and columnaris, two major diseases of U.S. farm raised catfish. Both diseases together cost the U.S. catfish industry \$50-70 million annually. The modified live vaccines are administered by bath immersion, a non-stressful and inexpensive process, to large numbers of young fish and provide life-long protection.

**Team:** Phillip H. Klesius, Joyce J. Evans and Craig A. Shoemaker

**Transfer:** Both vaccines (AQUAVAC-COLTM and AQUAVAC-ESCTM) were developed under a CRADA with Intervet, Inc., and exclusively licensed to Intervet.

#### \*Agricultural Research Service, South Atlantic Area

A fertilizer alleviating nickel deficiencies.

**Summary:** The new Nickel Plus™ associated technology has cured significant plant disorders and diseases having a beneficial impact of millions of dollars. Additionally, evidence indicates improving nickel nutrition may also serve to improve environmental quality because it reduces the use of fungicides and nitrogen fertilizers for certain crops.

**Team:** Bruce W. Wood

**Transfer:** A cooperative interaction was initiated to jointly develop a commercial nickel fertilizer product (Nickel Plus™), and a new company (NIPAN, LLC) was formed. NIPAN, the co-owner of the patent, is negotiating an exclusive license to ARS' interest in the technology for correcting nickel deficiency in plants.

### Department of Defense—Army

\* Corps of Engineers, Engineer Research and Development Center, Construction Engineering Research Laboratory Electro-Osmotic Pulse (EOP), for the control of moisture in below-grade concrete structures.

**Summary:** EOP eliminates moisture in below-grade structures, preventing the occurrence of mold, mildew, bacteria, corrosion, and standing water. It uses the concrete itself as the waterproofing agent by exploiting the fundamental

properties of electro-osmosis. EOP is better, faster and 40 percent less costly to install than conventional moisture control solutions.

Team: Orange S. Marshall, Michael K. McInerney, Sean Morefield and Vincent F. Hock

Transfer: In 2004, a new CRADA was implemented with industry partner, Drytronic. The parent company created the spin off, OsmoTech, to maximize EOP commercialization. The novel inter-relationship between the ERDC, Drytronic and its licensee OsmoTech has grown client application potential to include projects such as highway construction and tunnels.

- Edgewood Chemical Biological Center

Enzyme-based decontamination technology for organophosphorus nerve agents and pesticides.

Summary: This technology simplifies and improves the process of decontaminating a class of highly toxic chemicals, including nerve agents. The ECBC technology is non-toxic, non-corrosive, and environmentally safe.

While initially intended for decontaminating equipment, facilities, and large areas, the enzymes could potentially be used in shower systems for decontaminating personnel and casualties.

Team: Joseph J. DeFrank, Tu-Chen Cheng, Vipin K. Rastogi and Christopher S. Penet

Transfer: Genencor International, Inc., agreed to license the technology and is now successfully producing the licensed enzymatic decontamination technology under the trademark DEFENZ™. Companies that produce and sell fire-fighting foams and sprays and other matrices are purchasing this product.

- Institute of Surgical Research

Special Medical Emergency Evacuation Device (SMEED).

Summary: A patent-protected metal framework that attaches to evacuation litters and holds individual pieces of medical equipment needed for optimal patient transport, lessening the discomfort of burn victims during medical transport. It eliminates the need to fasten uncomfortable equipment directly to patients and gives health care providers a clear view of any readout monitors on attached medical devices.

Team: Sgt. Eric Smeed (yes, that's Smeed!)

Transfer: The Army patented the device and in 2002 awarded a Small Business Innovation Research contract and exclusive license agreement to Impact Instrumentation Inc. of New Jersey. The company further developed the technology, manufacturing a commercial product now on the market.

## Department of Defense—Navy

- Naval Air Warfare Center Aircraft Division, Lakehurst

Liquid Atomizing Nozzle

Summary: A lightweight, non-clogging, inexpensive technology that does not require the extremely high operating pressures of standard fire suppression systems. It conserves water and minimizes consequential water damage and is a more environmentally safe method of fire suppression onboard aircraft. Smaller amounts of water can extinguish a fire more quickly, making it possible to carry water rather than environmentally harmful chemicals like halon, which is traditionally used in aircraft fire extinguishment systems.

Team: Joseph Wolfe

Transfer: Patented in 1996, the technology was transferred in 2001 via a partially exclusive license agreement to the aerospace supply company, International Aero Inc. of Burlington, Wash. The resulting commercial product, the Fine Water Mist System, awaits FAA approval for widespread aircraft use.

- Naval Air Warfare Center Aircraft Division, Patuxent River

Trivalent Chromium Processes (TCP).

Summary: A metal surface coating containing trivalent chromium sulfate that protects against corrosive environments, a significant improvement over the widely used, traditional but toxic hexavalent chromium process. The chemical solution minimizes corrosion of aluminum, zinc, and other substrates while it improves the bonding surface for paints.

Team: James L. Green, Michael J. Kane and Craig Matzdorf

Transfer: Under nonexclusive patent license agreements with several companies, the center has successfully transferred this important advance in metal finishing to widespread civilian use. Currently four licensees are in various stages of marketing TCP to consumers in the United States, Canada and Mexico.

•Naval Medical Center, San Diego

Treatment of noise-induced hearing loss through biologic mechanisms.

Summary: An orally administered antioxidant pharmaceutical product that will prevent, reduce, and in some cases even reverse acute noise-induced hearing loss. According to the Center for Disease Control, hearing loss costs the nation about \$56 billion a year.

Team: Richard Kopke and Michael Hoffer

Transfer: This technology has been successfully transferred to the private sector through an exclusive patent licensing agreement with American BioHealth Group (ABG). ABG has been on the fast track and one product based on this technology is already available to the public as a nonprescription nutraceutical known as "The Hearing Pill™."

•Naval Undersea Warfare Center Division, Newport

Robust dimension reducing decision support tool for large, complex datasets.

Summary: The Data Extraction and Mining Software Tool (DEMIST) for large, complex data sets was developed and patented to support classification of targets for U.S. Navy sonar systems. DEMIST takes large, multi-dimensional datasets and reduces them dramatically in size to include only the relevant information needed for decision-making.

Team: Robert Lynch

Transfer: Under multiple CRADAs, DEMIST is being incorporated in software suites for credit scoring, consumer market targeting, chemical analysis, enterprise level risk management and decision support industries. Additional applications and licensing agreements are in process to apply DEMIST to problems associated with medical applications such as bioinformatics, pharmacogenomics and for homeland security-related data mining.

Department of Defense—Air Force

•Air Force Research Laboratory, Directed Energy Directorate

Low emission, high current density field emission cold cathode.

Summary: This cold-cathode technology can deliver high electron current densities using very low power, therefore allowing the systems into which they're installed to operate at cool temperatures and be light in weight.

Team: Donald Shiffler

Transfer: The technology has been transferred to Fiore Industries, Albuquerque, through a licensing agreement. The technology has been further transferred to the private sector through CRADAs with companies that are developing X-ray tubes based on this cold cathode technology and has also been directly transferred through consultation and discussion to other federal labs, including Sandia National Laboratories.

•Air Force Research Laboratory, Human Effectiveness Directorate

The Attenuating Custom Communications Earpiece System (ACCES®)

Summary: The Attenuating Custom Communications Earpiece System (ACCES®), integrates specialized electronics and cabling into a custom-molded earplug that provides 40dB of mean noise reduction while providing clearly intelligible voice communication.

Team: John A. Hall

Transfer: Westone Laboratories, the tech transfer partner producing this state-of-the-art device, was recently awarded a General Services Administration contract. Even before gaining the GSA contract, ACCES had its inaugural commercial use in Spaceship One, the first private craft to fly more than 50 miles above the earth.

•Air Force Research Laboratory, Materials and Manufacturing Directorate  
Vascular Viewer™

Summary: A patent-protected viewing device that reveals blood vessels in the body under a broad range of lighting conditions. Medical personnel can use the invention to access blood vessels more quickly and accurately, even in extreme conditions such as on the battlefield or during trauma care.

Team: Robert Crane, Byron Edmonds, Walter Johnson and Charles Lovett

Transfer: The invention now is available as a commercial product—the Vascular Viewer—with impressive potential for saving lives, minimizing patient discomfort, and reducing health care costs. The Air Force awarded an exclusive license to a company to develop and market the technology, InfraRed Imaging Systems of Columbus, Ohio.

•Air Force Research Laboratory,  
Propulsion Directorate

Silicon Carbide Schottky Diodes

Summary: This specialized semiconductor device is proven to reduce energy losses from conduction and switching, and for faster switching characteristics in high-speed electronic circuit applications.

Team: James Scofield

Transfer: In collaboration with Mississippi State University to incubate SemiSouth Laboratories under funding from the Ballistic Missile Defense Organization (now known as the Missile Defense Agency), this collaboration made Silicon Carbide fabrication practical for power devices. Also, a dual use science and technology agreement was implemented with manufacturer Cree, Inc., of Durham, N.C.

Department of Energy

•Argonne National Laboratory

Ultrananocrystalline Diamond (UNCD) coating technology for advanced multifunctional devices.

Summary: The coating technology captures many natural diamond properties in thin-film form and greatly surpasses other diamond film technologies with commercial potential.

Team: Orlando Auciellor and John A. Carlisle

Transfer: The UNCD thin-film technology was successfully transferred to an ANL-founded startup company, Advanced Diamond Technologies, Inc.

•Lawrence Livermore National Laboratory

ELITE: Easy Livermore Inspection Tester for Explosives

Summary: A disposable, portable, highly accurate explosives detector.

The ELITE detection card is highly sensitive to more than 30 explosives, making it one of the most effective detection systems available.

Team: John Reynolds, Ray Pierce, Peter Nunes, J. Del Eckels, Randall Simpson, Catherine Elizondo and Richard Whipple

Transfer: Field Forensics, Inc. responded to a Federal Business Opportunities announcement of the ELITE licensing opportunity and was chosen as the licensee.

•Los Alamos National Laboratory

PowerFactoRE—Reliability engineering toolkit for optimizing the manufacturing process.

Summary: A comprehensive approach to reducing operating costs and minimizing capital expenditures for manufacturing operations. PowerFactoRE enables manufacturers to predict, prevent, and reduce reliability losses, equipment failures, and repair downtime.

Team: Mike Hamada and Harry Martz

Transfer: Proctor & Gamble and LANL signed a CRADA to do reliability modeling using P&G data and Los Alamos expertise. Other manufacturers are realizing the same advantages P&G has enjoyed by licensing the PowerFactoRE toolkit from P&G and its marketing partners, BearingPoint and Zarpac, Inc.



•NNSA's Kansas City Plant

Improved method to separate and recover oil and plastic.

Summary: A new system for recycling plastic and oil that uses liquid and supercritical carbon dioxide to blast oil residue off of empty plastic motor oil bottles.

Team: George Bohnert, Thomas Hand, Gerald Woodburn, Edward Fuller, Charles Cook, Charles Long and Louis Mautino.

Transfer: The Kansas City Plant patented this process and licensed the technology to Itec Environmental Group, which used it to develop a plastics recycling system called the ECO2. Itec has been able to use this system to recycle not only motor oil bottles, but almost every other type of consumer plastic as well.

•Pacific Northwest National Laboratory

A breakthrough treatment for prostate cancer.

Summary: A powerful new brachytherapy seed that uses <sup>131</sup>Cs, which has a low-energy x-ray that effectively provides a cancer-killing dose to a tumor in a short period of time.

Team: Larry R. Greenwood, Donald Segna, Mark K. Murphy, Jaquetta R. DesChane, Lane A. Bray, Deborah S. Coffey, David Swanberg, Chuck Z. Soderquist, Clay L. O'Laughlin and Garrett Brown.

Transfer: IsoRay, which became a publicly owned company in July 2005, started the effort to produce the seeds commercially using PNNL's Radiochemical Processing Laboratory in 2004 under a current agreement with PNNL.

Improving medical care and saving lives with bioactive thin-film coatings.

Summary: A first-ever, water-based process that allows calcium-phosphate thin-film coatings containing controlled-release bioactive therapeutic agents to be deposited on orthopedic devices and other medical implants, such as catheters and stents. This technology will play a major role in dramatically reducing post-surgical infections in implant recipients and wounded military personnel, and will greatly increase acceptance of artificial joints by the body.

Team: Allison A. Campbell and Eric R. Jutras

Transfer: The technology was licensed in 2004 by Bacterin, which recently joined forces with the Department of Defense, receiving a \$1.4 million appropriation to coat metal rods and pins with the technology for use in the battlefield. In addition, Bacterin has forged new relationships with three medical device manufacturers—Baxter International, C.R. Bard, and Cook—that have agreed to use the unique coating on their products.

Self-assembled monolayers on mesoporous silica (SAMMS) technology for mercury source reduction

Summary: A technology that quickly and easily reduces or removes mercury content without creating hazardous waste or by-products, and can be disposed of as a non-hazardous waste.

Team: Richard Skaggs, Glen E. Fryxell, Eric C. Lund, Shas V. Mattigod, Raymond S. Addleman, James J. Toth and Thomas S. Zemanian

Transfer: The technology has been presented to appropriate audiences and PNNL has developed relationships with industry partners, including Steward Advanced Materials, Chevron (formerly Unocal), Molycorp and PECO.

Starlight information visualization system

Summary: Starlight is the only software that can integrate many different data types and formats, perform high-speed, high-efficiency analysis, and display the results graphically so that the relationships among the data and their implications can be quickly and easily understood.

Team: John S. Risch, John Pinto, Michelle Hart, Dennis McQuerry, Brian Krizstein, Scott Dowson and Wes Hatley.  
Transfer: Between 2000 and 2005, nearly 40 licenses were issued to enterprises ranging from government offices to academia, from small competitive intelligence companies to large companies such as Toyota and Proctor & Gamble.

•Sandia National Laboratories

**Robust, wide-range hydrogen sensor**

Summary: The sensor offers both low-range and high-range hydrogen measurement capability on the same chip, virtually eliminating false readings and making it an ideal candidate for a variety of government and commercial applications.

Team: Paul Smith, Robert Hughes, Michael Knoll, Jose L. Rodriguez and Wayne T. Corbett

Transfer: H2scan Corporation of Valencia, Calif., has licensed the technology and through a formal CRADA has developed a small in situ sensor with the capability of detecting hydrogen concentrations between 10 parts per million and 100 percent. H2scan has three retail products in commercial use and has delivered sensors to over 200 government and industry customers, including a classified DOE plant in Idaho Falls.

■  
**SMART: Sensor for measurement and analysis of radiation transients system**

Summary: This system uses detectors and software to distinguish between normally occurring radioactive materials and those that are potential signatures of terrorist activities. The system operates in real time and indicates the level of confidence (low, fair, high) that the material has been correctly identified.

Team: Dean Mitchell, Jerry D. Strother, Peter E. Havey, Gene A. Kallenbach and Brent A. Burdick

Transfer: Sandia licensed its FitToDB and PASSBY software technology to Thermo Electron Corporation in 2003 and its GADRAS-LT software to Thermo Electron the following year. Under a CRADA signed in 2005, Sandia and Thermo Electron are also collaborating on refinement of the software for large-scale commercial deployments in Thermo Electron's advanced spectroscopic portal system.

■  
**SUMMiT V™ Fabrication Process and SAMPLES™ Program**

Summary: The Sandia Ultraplanner, Multilevel MEMS Technology (SUMMiT™) fabrication process is a MEMS batch fabrication process that uses conventional integrated circuit processing tools to achieve high volume, low cost MEMS production.

Team: Over 50 individuals.

Transfer: The SAMPLES™ program, which enable customers to develop their own innovative MEMS-based products by leveraging advanced design, fabrication (utilizing the baseline SUMMiT IV™ and V™ technologies), has generated 49 Work for Others agreements and over 75 software licenses related to the SUMMiT™ fabrication processes.

**Department of Health and Human Services**

• National Cancer Institute, National Institutes of Health

**Keipivance:** Improving the quality of life for cancer patients.

Summary: This invention describes the use of Palifermin, a recombinant human keratinocyte growth factor (KGF) that can be used to reduce the incidence and duration of oral mucositis (painful sores and ulcers in the lining of the mouth) in cancer patients.

Team: Jeffrey S. Rubin, Paul W. Finch and Stuart A. Aaronson

Transfer: Amgen was chosen as a commercial partner to develop a useful therapeutic with this molecule because it had worked with other growth factors such as PDGF and G-CSF. Convinced that KGF would fit well in Amgen's product development strategy, NIH granted them an exclusive license to the invention in 1992. It was approved by

the FDA in 2004 and sold under the brand name Kepivance.

## NASA

### John F. Kennedy Space Center

#### Emulsified zero-valent iron (EZVI)

**Summary:** A cost-effective technology for the in-situ treatment of dense non-aqueous phase liquids (DNAPL) source zone remediation and groundwater cleanup.

**Team:** Jacqueline W. Quinn, Debra R. Reinhart, Christian Clausen III and Cherie L. Geiger

**Transfer:** Kennedy Space Center signed five nonexclusive licenses with companies wanting to market and further develop EZVI.

### •Marshall Space Flight Center

#### High-strength, wear-resistant aluminum alloy

**Summary:** Originally developed by NASA as a high-performance piston alloy to help meet U.S. automotive legislation requiring low-exhaust emission, the substance offers the dramatic increase in tensile strength at elevated temperatures (from 450 to 650 °F) needed for many applications.

**Team:** Po-Shou Chen, Jonathan Lee and Sammy Nabors

**Transfer:** The technology was recently used in Bombardier Recreational Products' Evinrude product line to meet the unique requirements of a direct-injected two-stroke outboard engine with world-class emissions levels. An ideal low-cost material for cast automotive components, the innovative alloy is enabling engine manufacturers to make engines that produce more horsepower at lighter weights that emit less pollutants.

For more information, see [www.federallabs.org](http://www.federallabs.org).

## Explosives Detection

### The Three Sectors of Society That Rely on Explosives Detection

Category: Explosives Detection — kevindark @ 7:25 pm

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After an explosion one does not need an expert to conduct explosives detection. For security personnel, however, the real trick is finding a way to detect an explosives device before its detonation leads to injuries or fatalities. Three different sectors have had reason to hire large numbers of security personnel. Three different sectors of society have reason to purchase equipment for explosives detection. The following article takes a closer look at the nature of the security needs in those three sectors. It also mentions how new and improved detection devices can alleviate the threat posed by many types of dangers.

Explosives, such as those in firecrackers, have been around for quite some time. The need for detection of those who possess such explosives has recently created an entire new industry. The equipment produced by manufacturers within that industry has been purchased by groups in three different sectors of modern-day society.

Those involved with transportation security represent one group that has come to rely on explosives detection. At one time detection of explosives relied exclusively on the use of metal detectors. Present-day suicide bombers, however, have forced those in transportation security to look beyond the ability to detect metallic devices. Present-day explosives detection must be able to pick-up those who have non-metallic devices on their person.

One device that can do just that is the Sentinel II, a device used at portals in airports. The Sentinel II causes a flow of air to pass over each passenger. The air removes any loose explosives particles from the skin or clothing. The sample obtained from each passenger needs to be analyzed for explosives.

The members of the military occupy the second sector of society that has come to rely on explosives detection. The manufacturers of the detection devices for the military have focused their efforts on the miniaturization of existing devices. They have now developed collective protection alarms that are easy to move from place to place. Such alarms offer added protection to military vehicles, small boats with military personnel and command bunkers.

The third sector of society that has started to use explosives detection contains the persons involved with facilities security. This represents a large sector, one with many possible targets for explosive devices. Some of the facilities can be described as vital utilities. Water treatment plants and electrical generators powered by nuclear reactors are two such vital utilities. Sports centers and shopping malls are also facilities that have been mentioned as "soft targets" for explosives experts.

At all of those facilities the security personnel have three major concerns. One concern focuses on possible contamination in the heating, ventilation or air conditioning systems. A second concern considers the possible contamination of the water supply. The third concern brings-up the need for explosives detection. That is the fear that someone could plant a bomb inside of any such facility.

The above information has failed to mention one further possible threat to the occupants in any facility. It is also a threat that could disrupt the functioning of a transportation system. That unmentioned threat received much media attention in the mid 1990's. At that time, a terrorist released a toxic gas into a Japanese subway.

Hopefully the latest developments in explosives detection will lead to the development of ways to deter a repeat of such a frightening action.

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## **HomelandDefenseStocks.com Reports: As Terrorist Attacks Continue, Need for Explosives Detection System Technology Surges**

Market Wire, July, 2005

www.HomelandDefenseStocks.com (HDS) an investor news portal for the homeland defense and security sector, reports on the need for explosives detection system technologies as threats of terrorist attacks continue. Companies working towards bomb detection technology include L-3 Communications Security and Detection Systems, Inc. (NYSE: LLL), the world's leading supplier of X-ray security screening systems; Markland Technologies (OTC BB: MRKL) a defense and homeland security company transforming advanced laboratory technology into real-world products such as next-generation electronic imaging and other detection solutions; Sniffex (OTC: SNFX) manufacturer of a pocket-sized, hand held explosives detection device; and Law Enforcement Associates Corporation (OTC BB: LENF), a manufacturer of a diverse line of undercover surveillance and detection products.